Gas Journal

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Editorial Notes

The Late Harold Shewring

THE world was thrilled, a month or two ago, by the story of a sea episode in which a tiny yacht was involved in disaster off our South Coast; of one man's life given in a vain attempt to save his friend; of the two men's sons sailing the boat to harbour with their lives entirely altered in one brief hour.

The thrill of such stories is for the world; it is a passing one, and life goes on as before. For the few there comes a moment when thrill gives way to shock, and so it was when the Gas Industry realized that, by the sea episode of the tiny yacht, it had lost one of its number who had been not only esteemed for his professional accomplishments, but also loved for his personal qualities by all who knew him.

And since that time, as shock was succeeded by sorrow and a sense of loss, the thoughts of Harold Shewring's friends and colleagues have been concentrated on the situation of the still fewer to whom the sea episode brought nothing but stark tragedy. Their needs, in spite of the really wonderful generosity of his late employers, are well enough known, and many who were admirers of Harold Shewring will be grateful to Mr. F. G. Shaw for a move he has made towards translating sympathy into help of a practical nature.

In other columns of this issue will be found a letter explaining the arrangements which Mr. Shaw has made, in collaboration with two of his colleagues in the Industry, for placing at the disposal of Harold Shewring's dependents any sums which may be subscribed to a fund opened for the purpose. It goes without saying that we have acceded to the request of Mr. Shaw and his friends that we should sponsor the effort under the name of "'GAS JOURNAL' Shewring Fund," and it remains only to ask that subscriptions be sent as soon as possible. Where need is great, *bis dat qui cito dat.*

Gasholder Inspection

IN other columns of this issue we publish the Press Report of the July meeting of the National Gas Council Central Executive Board. Among other important matters which were under discussion at that meeting was, it will be noted, a recent communication from the Chief Inspector of Factories indicating that he is proposing to recommend the inclusion, in a Factory Bill to be introduced into Parliament, of provisions requiring periodic inspection of water-sealed gasholders by all gas undertakings.

This is a subject which is with us all the time, but which comes into the open only spasmodically. Clearly, as each year passes, the matter becomes of greater moment to our Industry, even if by only a small percentage, since it cannot be assumed that any material will last for ever, and there are hundreds of holders which have been in commission for very many years. On the other hand, it is essential to avoid by all possible means the dissemination among the public, either maliciously by our detractors or in ignorance by habitual sensation mongers, of the idea that the country, especially in populous districts, is studded with potential calamity spots, or that the magnificent safety record of the Gas Industry extending over a century and a quarter is likely to be broken quite suddenly by a deafening series of death dealing bangs. The gas engineer knows well enough how ludicrous any such idea is, but one can imagine a very pretty story being made out of it by certain sections of the lay Press, with complete forgetfulness of the said magnificent record and complete ignorance of the technical working of those structures to which they habitually refer as "gasometers."

It is chiefly for this reason, apart from our natural dislike for any kind of bureaucratic control over technical industries, that we regret the communication of the Inspector of Factories. At the same time we cannot entirely regret that the question is likely to be brought to a head and, if this is to be done in a manner distasteful and disadvantageous to the Industry, we cannot hold the Industry entirely blameless. In any case a statutory obligation upon every gas undertaking to safeguard the position will be a comfort to the vast majority, who already take proper steps, in assuring them that they will not be let down by the small minority who have either been very foolishly satisfied or very reluctantly compelled to live in hopes rather than in the sure knowledge that all is well.

The various circumstances of this insignificant minority are well enough known, and it is difficult to see how compulsion, otherwise than by legislation, could really ever be effectively applied. The Industry must, therefore, perhaps congratulate itself once again upon the possession of such a body as the National Gas Council—a representative body of such prestige that communications

such as that of the Inspector of Factories are, almost as a matter of course, made to it. The Council, in its turn, has behind it The Institution of Gas Engineers, which has at its disposal the best technical brains and a mass of experience of the Industry, and also a Gasholder Committee whose special duties have been to study such questions as inspection and safety. Quite properly the Council have referred the Inspector's letter to the Institution, with a request for a report. The Inspector, therefore, if he feels that legislation on the subject is called for, can well congratulate himself in turn upon the fact that the means are readily to his hand for obtaining the very best advice possible on the subject.

It is scarcely conceivable, indeed, that the Inspector would embark upon legislation, without the consultation which his communication implies, upon so intricate a subject as gasholders, because actually it is aiming no criticism at the technical skill of our Industry if we say that not even every gas engineer can be expected to be an expert on gasholders. Expert advice is, however, readily available to all who desire it, and personally we cannot see why any gas engineer should not welcome independent inspection if for no other reason than to safeguard his own interests. Moreover, it is not a question of expert inspection every few minutes. A favourable report would set the mind at rest for years; an unfavourable report would suggest a remedy, which would have the same effect.

Apart, therefore, from our natural reluctance to see any further legislation or bureaucratic control forced upon us, it seems that the Industry need fear no great hardship from forthcoming events in this direction. It is unthinkable that the Inspector would embark upon anything contrary to the best advice available on the subject, and obviously the national bodies of the Gas Industry have unrivalled qualifications in this regard, together with a very highly developed sense of responsibility as to the Industry's obligations *vis-à-vis* the public, as well as a proper appreciation of what constitutes a fair deal for the suppliers of gas.

Benzole Recovery

Much useful and important information on the recovery of benzole from gas, and more particularly on the treatment of the crude benzole, is contained in the Paper which Mr. Adam and Dr. Anderson, of the Gas Light and Coke Company, presented at the Chemical Engineering Congress of the World Power Conference. It is information all the more important in that it is based on very large scale working of both the oil washing and the active carbon processes; indeed, the active carbon plant at Beckton must be the largest in the world. In a general comparison of these two processes the Authors point to the increased efficiency of the more popular process, that of oil washing, in recent years, and ascribe this increase to the competition of the active carbon process. We suggest, however, that this competition is only partially responsible for the greatly improved efficiency of oil washing. At any rate, both the quality of the benzole produced, and the consumption of steam, have improved so that the difference between the two processes as they exist to-day is not so marked as when the active carbon process was first introduced. It is maintained in the Paper, though, that the active carbon process still shows some advantage over the oil washing process on account of its lower steam consumption, freedom of the benzole from wash oil, and higher extraction efficiency both for benzole and organic sulphur compounds contained in the gas.

This capacity for removing sulphur compounds is, of course, a highly attractive feature in regard to gas supply. The importance of supplying a gas as free as possible from sulphur compounds has been emphasized many times in these columns; and we are naturally interested in the reference made to the subject by Mr. Griffiths, of the Gas Light and Coke Company, during the discussion on the Paper. He explained that an active carbon plant had recently been put down for the purification of town gas which had previously passed through an oil-wash benzole extraction plant. The result showed a decrease in the sulphur content of the gas from 25-30 grains per 100 cu.ft. to below 5 grains. This, he said, had proved to be quite easy and economical. Removal of sulphur compounds from the gas by the active carbon process has not, however, tended to make the task of the benzole refiner any easier, as these sulphur compounds find their way into the crude benzole; and a large part of the Paper is devoted to the removal of sulphur from benzole—a subject which has demanded increased attention due to the development of the inhibitor process. The acid-washing process, while removing the useful unsaturated hydrocarbons, at the same time eliminated the thiophen content, and with the removal of some of the carbon disulphide during the final distillation, the benzole easily conformed to specification as motor spirit. Application of the inhibitor process reversed this, and means had to be adopted to remove the carbon disulphide. As is well known, this can be accomplished either by fractionation or by some chemical process such as the methanol-soda or the ammonium polysulphide, introduced respectively by the National Benzole Company and the Yorkshire Tar Distillers, Ltd.

At Beckton fractionation is favoured, and the Authors describe the Barbet unit which was installed for this purpose in 1933. They state that the fractionation process is "very economical and highly efficient," but while they give working costs of the methanol-soda and the ammonium polysulphide processes, they do not put forward any costs relating to the Barbet fractionation method. They simply state that the steam consumption is 9 lb. per gallon of crude benzole. It was suggested during the discussion, however, that when capital costs and the cost of the forerunnings lost in the Barbet column were entered against the process, there would be little to choose between the operating costs for the three processes and choice between them would be governed largely by local circumstances. The Barbet column, it was suggested, being continuous, would be most suited to a works having a constant throughput of crude of a fairly constant composition, and that the ammonium polysulphide process commended itself to a small works within easy distance of a plant producing the reagent, while it was mentioned that the methanol-soda process had found application on works handling varying crude where the Yorkshire Tar Distillers' reagent was not available. It was also suggested that, even if a suitable market could be guaranteed for crude carbon disulphide, on a small works the product would be more of an embarrassment than otherwise.

In the Public Eye

It has been to us, so long as memory serves, a matter of keen regret that gas has received so comparatively small an amount of attention in the general Press of the country, and this regret has been intensified during later years into a justifiable grievance by the large doses of publicity of this character that have been accorded another industry whose activities in some directions run

parallel with those of our own. One of the things the holding companies have accomplished through their operations is some extension of the meagre references to gas in the news columns of the daily Press, and this must advantage the Industry to the degree in which it assists to keep it in the public eye.

We are alluding now, of course, to items which may be fairly deemed to possess a definite news value, and not to that kind of free publicity which Mr. F. P. Bishop (Chairman of the Advertisement Committee of the Newspaper Proprietors' Association) told the first annual conference of the Empire Press Union " affects the advertisement side of newspapers most immediately, because of the threat it presents to their advertisement revenues." We would have gas take advantage of every opportunity that may present itself of securing publicity in the news columns of the papers for anything possessing definite news value, while at the same time urging the Industry adequately to avail itself of the advertisement pages for announcements that would suitably find a place there. Newspaper publicity of any kind is so extremely valuable that a thorough understanding of the different categories under which such publicity may rightly come is well worth while. We would not have gas come within the stricture of Mr. Bishop—that " advertisers (and, for that matter, non-advertisers, too) have always been anxious to obtain free ' puffs ' in the editorial columns of the Press, but of recent years the problem has become more acute, because there has been a deliberate attempt to organize free publicity, like advertising itself, on a scientific basis." So far as our own Industry is concerned, we would see news in the editorial columns, and as much publicity of other kinds as may be practicable in the advertisement columns.

Do not let us for one moment underestimate the value of the latter department of a paper. Big industrialists are generally agreed that, as Sir Herbert Morgan declared, when introducing a new Trust formed to hold shares in companies who are advertisers and who supply some portion of the essential needs of the people, " the maintenance of profits by providing for advertising expenditure is more certain than their maintenance in most other ways." The companies embraced in the Trust are all well known to the people of this country, and for the most part famous throughout the world. And how have they become so? Let Sir Herbert tell us: " Hundreds of millions have been spent in creating the goodwill of these companies. Research into the history of industry goes far to prove that goodwill is less of a wasting asset than plant, machinery, and buildings. National advertising, as we know it in 1936, was born about a hundred years ago, and there are firms trading to-day who still derive benefit from advertising almost a century old. It is for these reasons that the portfolio has been chosen from national advertisers." Here is something worthy the consideration of every industrialist.

Now let us revert for one moment to the " free " publicity question. How can the line be drawn between " puffs " in editorial columns which newspapers hate, and items of genuine news value which are the basis of their existence? The editor, if he possibly can, will refuse the puff, and if he does print it the intelligence of his readers will not take it for anything more than it is. But the point which is so often missed is that there is a very special skilled technique in writing up news for the Press, which can often make all the difference between unacceptable puff and highly desirable news matter, and those who do not possess this skill should enlist the help of those who do. Such proper preparation of news copy would not come under the stricture of " a deliberate attempt to organize free publicity; " the Gas Industry has an abundance of material of genuine news value to the Press. It also has the requisite skill available, the B.C.G.A. having special facilities for this particular kind of work, and some very convincing proofs of its success. Those who have not yet used this service are strongly recommended to try it, but above all not to sit on their news for a week before taking action. Even the most skilled hands may fail if their raw material is stale to start with.

Paying for Brains

Our observations in last week's " Journal " on the subject of specialization and salaries bears interesting witness to the truth of the old saying that there is nothing new under the sun, and reminds us that in the old days the " Journal " was always ready to sponsor the cause of adequate remunerations—though in those less enlightened days it was usually a plea on behalf of the engineer and manager alone.

It is interesting to note that exactly fifty years ago we had occasion to address a solemn warning to a certain north country corporation, with a make of gas of 150 million per annum, who were offering to " a gentleman competent to design and superintend new works and to manufacture and distribute gas " the princely salary of £200 a year. The writer in our columns made no bones about his views of the matter, and he did not mince his words when he stated that this corporation had done good service in furnishing a text for a vigorous denunciation—which he forthwith proceeded to give. They would do still better, he observed, if they succeeded in getting the " cheap and nasty " professional services of which they were in search, and paid the inevitable penalty. A touch of none too gentle irony was contained in his suggestion that " Salary not so much an object as a comfortable place " might be appended to many advertisements issuing from unemployed engineers and managers. Indeed, corporations might go a step further and ask their managers to pay a handsome premium for their berths.

The writer went on to ask gas committees generally whether they realized the immensity of the injury they were inflicting upon their constituents by such penny wise and pound foolish policy. Gas engineering and the management of gas-works, he said, constituted a profession to be learnt only by lifelong study and practice, and if men of skill, training, and honour were to be engaged in this business they must have as an inducement the hope of such payment as would support themselves and their families in respectable ease. The corporation and those who thought with them in those matters might imagine that they could make shift with someone of a different fibre. If they got a man after their own desire their punishment would be complete. Unfortunately it was the confiding ratepayers who would suffer first and after them the profession and the community. Such men as would take appointments of this class—although they might be innocent of the worst faults which the miserliness of their employers invited them to commit—might waste in a year ten times the salary of a good man, and this in ways that their cheeseparing superiors would never find out. They were by their short-sighted penury taking the most likely course for driving honourable and

skilled men out of the profession and offering a heavy premium upon corruption, carelessness, and waste of public money.

We give the above excerpts as an interesting sidelight on the position as it existed fifty years ago, rather than as a continuation of our comment last week on Mr. Creasey's Chemical Engineering Congress Paper. Circumstances have altered since those days, but it is still true that it is futile for any industry to hope to obtain the best brains at below the market value, and that the Gas Industry at the present time needs the best brains it can obtain, not alone on the engineering side, but in the many other branches which are growing in importance year by year.

GAS JOURNAL SHEWRING FUND

We have great pleasure in publishing the following self-explanatory letter introducing a project which we believe a great number of our readers already have at heart. It will, we feel sure, receive the most sympathetic consideration on all sides.

To the Editor,
"GAS JOURNAL,"
London.

DEAR MR. KING,—

In all my contacts in recent months with my fellow members of the Gas Industry, I have found a general feeling that the distressing circumstances of the widow of our late colleague, Harold Shewring, of Cambridge, call for help of some kind to be extended to her.

In an attempt to give material expression to the sympathy which is so universally felt, and which I have no doubt is shared by yourself, my friends and I have decided to enlist your assistance in making known to the Industry our intention of starting a fund. I already have an assurance that postages and any other expenses would be defrayed, and if you, Sir, would consent to the "GAS JOURNAL" sponsoring the Fund, with your good self as Honorary Treasurer, and collecting such subscriptions as may be forthcoming, we feel that an enterprise which we have very much at heart would be excellently begun.

I have been informed of the help given by the Cambridge Undertaking, which, considering the short time Harold Shewring was there, cannot be considered as anything but extremely generous. There is, however, need enough, unfortunately, for all the additional help we can offer to Mrs. Shewring and her young family.

In the confident expectation that you will kindly agree to give to the project the backing of your valuable paper and the publicity of its columns, and the name of the "'GAS JOURNAL' Shewring Fund," I send you a subscription of 5 guineas to start the Fund. My friends Mr. W. W. Townsend, Colchester, and Mr. James Bridge, Elland, have agreed to collaborate with me in the disposal of the Fund in the most effective manner, and it remains only to say in appealing for generous support that sums of any size will be gratefully received, and applied without deduction of any kind, for the benefit of the widow and family of Harold Shewring.

I will send to you any donations which may be sent direct to me, for your acknowledgment and receipt as Treasurer, and I hope that the total may be recorded from time to time.

Yours sincerely,
F. G. SHAW,
Engineer and Manager.

Corporation Gas Department,
Buxton,
July 18, 1936.

Needless to say the "JOURNAL" will be pleased to support in every possible way the project by which Mr. Shaw and his friends suggest giving practical shape to the universal sympathy felt for the dependents of the late Harold Shewring. The "GAS JOURNAL" Shewring Fund is therefore now open under the conditions set out in Mr. Shaw's letter.

The Editor, as Treasurer, will be pleased to receive donations as soon as possible, which will be applied, at the discretion of Messrs. F. G. Shaw, W. W. Townsend, and J. Bridge, without any deductions whatsoever, for the benefit of Mrs. Shewring, widow of Harold Shewring. Cheques should be made payable to "GAS JOURNAL," and crossed "Shewring Fund Account."

CORRESPONDENCE

The United States of America and the Third World Power Conference

SIR,—May I call attention to the Third World Power Conference at Washington, U.S.A., which opens on Sept. 7, 1936? Mr. J. R. W. Alexander has given to all of us who have asked particulars of the trip, including its cost. Those of us who went to Chicago and other cities in Canada and America three years ago will never forget the education we received in many gas subjects, to say nothing of the reception given to us by those wonderful Americans.

The World Power Conference is of the greatest possible consequence to all the gas fraternity at the present time. Gas is quite cheap in many towns in America, but I do not think that the use of gas in competition with coal and other solid fuel and even oil has been exploited to that degree warranted by the facts. Many English engineers realize—as the discussions at the 73rd Annual General Meeting of The Institution of Gas Engineers proved—where gas can be made to take its place as a fuel for steam raising and like industrial purposes as well as for domestic use. In my view it would help the Gas Industry of this country immensely to hear and discuss the subject generally at Washington.

The opportunity is not one to be missed. The cost of the trip is indeed trifling (from £110 to £160 inclusive, according to the itinerary and the length of the visit) when set against the direct commercial benefits to be derived by anyone who is responsible for the administration of a gas undertaking in this country—which means, in this connection, the preparation of coal as a fuel.

I feel very strongly on the advantages offered and sincerely hope that there will be a good response. I intend to go, who will go with me?

Yours, &c.,
GEORGE HELPS.

The Nuneaton Gas Company,
Queen's Road, Nuneaton.
July 15, 1936.

News in Brief

The Price of Gas is to be raised by 2½d. per 1,000 cu.ft. in the area supplied by the Vale of Leven Gas Company.

Gas Will Be Cheaper by 2d. per 1,000 cu.ft. in Markinch, Fifeshire, at the beginning of the next quarter.

Owing to the Increased Cost of Coal the price of gas supplied by the Stane and Dykehead Gas Company has been increased by 5d. per 1,000 cu.ft.

An Increase in the Price of Gas by 2½d. per 1,000 cu.ft., making 2s. 8½d. per 1,000 cu.ft. or 7·39d. per therm, is announced by the Hamilton Town Council.

New Showrooms and Offices were opened at 145, Commercial Street, Kirkcaldy, on July 13 by Councillor Grieve, Convener of the Kirkcaldy Gas Department.

Following a Successful Year, gas sales being up 8·5%, the Stratford-on-Avon Gas Department announce a reduction in the price of gas of 1d. per 1,000 cu.ft. The new price is to take effect from the June meter readings.

Application for a Special Order under the Gas Undertakings Acts, 1920 to 1934, is intended to be made to the Board of Trade by the Harrogate Gas Company with the object *inter alia* of extending the existing limits of supply.

The Second National Coal Convention, organized by the Coal Utilisation Council, will be held at Grosvenor House, London, on Oct. 29 and 30 next. H.R.H. The Duke of Kent has consented to open the Convention on the first day.

A Special Order is to be sought by the Kirkintilloch Town Council to enable them to proceed with the purchase of the Lennoxtown Gaslight Company's Undertaking, after which the Lennoxtown area will be supplied with gas from Kirkintilloch.

A Reduction in the price of gas by 2d. per 1,000 cu.ft is announced by the Buckhaven and Leven Gas Commissioners, acting on the recommendation of their Engineer and Manager, Mr. H. A. Aitken. A steady increase in the sales of gas was reported by Mr. Aitken, and, despite an extra £1,000 spent on coal, the estimated surplus is £1,148.

The Tenders sent in for the £5,000 4½% Preference Stock which Messrs. A. & W. Richards, 37, Walbrook, E.C. 4, offered on behalf of the City of Chichester Gas Company, were opened on July 17. They amounted to a total of £21,850, at prices ranging from £112 per £100 down to the minimum of £105. The lowest accepted tender was at £108 per £100, and the average price obtained was £109 11s. 8d. per £100.

Cramped for Want of Space for urgent extensions, the Dalkeith Gas Light Company (as we announced in the "JOURNAL" for July 1) wrote the Dalkeith Town Council asking what prospects there were of obtaining more ground adjacent to the Works. The only possible site was a public playing field. It was pointed out in the letter that failure to secure more ground would result in the transference of the Works. We now learn that the Council have intimated to the Company that they have no right to feu any portion of the adjoining park.

A Babel of Tongues was heard in Morley last week when 60 members of the Second International Glass Congress visited the Morley Works of Messrs. Hailwood & Ackroyd, Ltd. The party included delegates from France, Belgium, Germany, Norway, Denmark, Czecho-Slovakia, Spain, Austria, and the United States of America, and they had chosen to visit this, one of the largest works of its kind in the country, as part of their programme at Sheffield University, which was made their headquarters that week. The visitors were cordially welcomed by Mr. E. A. Hailwood, Managing Director, and Mr. R. Baines, Director. They were subsequently entertained at tea by kind invitation of the Company.

Amalgamation and Grouping

United Kingdom, Rothwell, and Garforth.

Messrs. Close Brothers, Ltd., the Secretaries of the United Kingdom Gas Corporation, Ltd., announce that the Corporation has recently acquired 99·05% of the Ordinary Share Capital of the Rothwell Gas Light Company and 98·15% of the Share Capital of the Garforth Gas Consumers' Company.

Arthur Duckham Memorial Fund

An interesting announcement by the Committee is to the effect that applications are now invited for the Arthur Duckham Research Award for 1936-37—namely, a Fellowship of the value of £350, for the purpose of investigating abroad recent developments in the manufacture, distribution, utilization, and/or supply of gas and its by-products. Applicants must be not more than 30 years of age and possess an Honours Degree of a British University, preference being given to those having experience in the Gas Industry.

Particulars will be found in the advertisement columns of this issue.

North British Association of GasManagers

Forthcoming Annual Meeting

The Annual General Meeting of the North British Association of Gas Managers will be held in the Town Hall, Kirkintilloch, on Thursday, Sept. 10, under the Presidency of Mr. J. Dickson, of that town.

On the previous day the Golf and Bowls Competitions will be held, and after the morning session on the Thursday members will be the guests of the Town Council at luncheon. The Council of the Borough will also accord a civic reception to the members and their ladies in the Town Hall in the evening, when Provost R. Hudson, J.P., will receive the guests at 7.30 p.m.

The usual annual excursion will take place on the following day (Sept. 11), and will take the form of a cruise to Inveraray.

Personal

We learn that Mr. A. E. RUFFHEAD has completed twenty-five years' service as Engineer and Manager to the Darlington Town Council Gas Department. He recently received the congratulations of the Council and his colleagues.

* * *

Mr. W. R. GILL has been elected Chairman of the Castleford and Whitwood Gaslight and Coke Company, which was recently purchased by the United Kingdom Gas Corporation, Ltd. Mr. Gill's father, the late Mr. Thomas Gill, J.P., was Chairman of the Company for twenty years, and Mr. Gill has been on the Board of Directors of the Company for fourteen years.

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Mr. EDWIN FLETCHER, B.A. (Hons.Cantab.), A.S.A.A., F.R.Econ.S., who joined the Staff of The Institution of Gas Engineers in 1931, has resigned his position in order to undertake economic research for the firm of O. W. Roskill, Industrial Consultants, 46, Catherine Street, S.W. 1.

Forthcoming Engagements

July.

23.—I.G.E.—Gasholder Committee at 2.30 p.m.

24.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS (EASTERN DISTRICT).—County Meeting at Swindon.

24.—I.G.E.—Joint Lighting Committee at 2.30 p.m.

27.—GAS COMPANIES' PROTECTION ASSOCIATION.—Committee Meeting at 3 p.m.

Aug.

11.—IRISH ASSOCIATION OF GAS MANAGERS.—Annual Meeting at Jury's Hotel, Dublin.

Sept.

8.—N.G.C.—Meeting of the Central Executive Board.

10.—NORTH BRITISH ASSOCIATION.—Annual Meeting at Kirkintilloch.

24.—WALES AND MONMOUTHSHIRE ASSOCIATION.—General Meeting at Porthcawl.

Oct.

3-6.—B.C.G.A.—Jubilee Conference at Bath.

Nov.

3 and 4.—I.G.E.—Autumn Research Meeting.

26.—I.G.E.—Advisory Committee on Research at 2.30 p.m.

Institution of Gas Engineers

Education and Examinations

Examinees.—The Comparative Statistical Schedule of the 1935 and 1936 Examination Results of The Institution of Gas Engineers indicates that the number of Examinees is maintained. It is interesting to observe that, when the published figures are increased by adding the number of candidates who sat for the Examinations, but whose Results are not included for the reasons given in the prefatory note to the published Results, the number was 513 in 1935 as compared with 519 in 1936.

Qualifications for Membership of the Institution.—Possession of the Diploma in Gas Engineering (Manufacture) or of the Diploma in Gas Engineering (Supply) admits to Associate Membership and is one of the qualifications necessary for admission to Membership of the Institution. The Higher Grade Certificate in Gas Engineering is required, in the absence of the B.Sc. Degree in Gas Engineering, for election as an Associate Member. The Higher Grade Certificate in Gas Engineering or Gas Supply is an alternative part qualification for admission to Associateship. The Ordinary Grade Certificate in Gas Engineering or Gas Supply is an alternative part qualification for admission to Studentship of the Institution. Studentship ceases at the age of 24 years. If a Candidate for admission to Associate Membership is a Student of the Institution at the time of his application he is eligible for election, if otherwise qualified, at the age of 21 instead of 25 years. Many Candidates for admittance to the Institution are unable to avail themselves of this advantage owing to their having omitted to seek election to Studentship.

Nomenclature.—Commencing with the next revised edition of the Education Regulations, the terms "Gas Engineering (Manufacture)" and "Gas Engineering (Supply)" will be substituted in all three Grades for the terms "Gas Engineering" and "Gas Supply."

Higher Grade Certificates.—From Oct. 1, 1936, a Second Class Higher Grade Certificate in Gas Engineering or Gas Supply shall be sufficient for entry to the Diploma Examination in Gas Engineering (Manufacture) or (Supply).

General Education for the Diplomas of the Institution.—For the purpose of entry to the Diploma Examinations of the Institution, the Gas Education Committee has to be satisfied as to the Candidates' general education. In some cases the only evidence presented is a statement, often vague, from the late Headmaster of the Candidate. On and after Oct. 1, 1936, therefore, Candidates for the Diploma Examinations of the Institution who cannot produce the usual Educational Certificates or other satisfactory evidence as to the standard of their general education will be required to submit themselves to an Examination conducted by the Institution and consisting of

(i.) an Essay;
(ii.) a General Knowledge Paper;
(iii.) a Conversation based more or less on the Candidates' work under (i.) and (ii.).

Gas Fitting Examinations.—The Oral Examination forming part of the Gas Fitting Examinations of the City and Guilds of London Institute will be discontinued from and including the 1937 Examinations for the Gas Fitting Certificate.

Dates of Examinations, 1937.—The next Examinations in Gas Engineering will be held on April 24, 1937, and in Gas Supply on May 1, 1937. Applications to sit for either of these Examinations should be received by the Secretary not later than Feb. 28, 1937. The Education Calendar for 1937 will be available in December next.

Charles Hunt Memorial Medals.—The Charles Hunt Memorial Medals, generously endowed in 1930 by Mr. P. C. Holmes Hunt, on behalf of himself and his brothers and sisters, in memory of their father, are not awarded on the 1936 Examinations.

Thanks of Council.—The Council directs that its thanks should be conveyed to the Government Education Departments, the Gas Education Committee and the Board of Examiners, the amount of whose work is continually increasing, and to all those who render assistance in connection with the Education Regulations, particularly to the Principals of Technical Colleges and Teachers throughout the Country conducting Approved Major and Minor and Gas Fitting Courses, to the Examining Bodies who conduct Ancillary Subject Examinations for External Candidates at home and overseas, to the District Gas Education Committees, and to the City and Guilds of London Institute.

Further information in regard to publications, permission to sit for examinations, entries for ancillary subject examinations, and publication of theses, which is the same as in previous years, will be found in the "JOURNAL" for July 31, 1935 (p. 207).

Mutual Assistance by Gas Undertakings

A Suggestion from Ossett

At a meeting of the Ossett Council held on Monday evening, July 13, the action of the Chairman and Gas Engineer and Manager, Mr. A. E. Mottram, in making immediate arrangements for a supply of gas to Dewsbury following the explosion at Dewsbury Gas-Works was approved, and it was decided to place on record their sincere appreciation and thanks to the Chairman, Manager, and everyone concerned for the prompt and efficient manner in which they rendered valuable assistance to a neighbouring authority so terribly affected as the result of a disaster. The Chairman, the Mayor, Alderman Wilson, and Councillors Bickle and Mason were appointed a sub-committee to discuss with representatives of Gas Undertakings at Mirfield, Dewsbury, Batley, and Wakefield (subject to the consent of these bodies) the question of linking up the mains between the areas in case of any further breakdown of supplies.

Councillor Marsden moved the adoption of the minute, and another which proposed that the Gas Manager be instructed to inform the Sitlington Parish Council that the Corporation were prepared to take over the street lighting in their area provided they had full control of the lamplighter and the maintenance of the lamps. He felt sure they could promise them an improvement in the lighting.

Councillor S. B. Stead seconded and the motion was carried.

Two Prize-Winning Carnival Displays

A decorated lorry, which was entered by the Wilmslow and Alderley Edge Gas Company, was awarded third prize in the recent local Carnival.

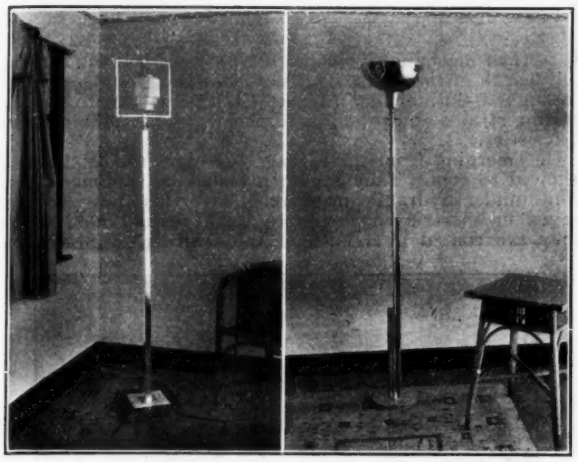
This ingenious display, which was entered by the Colchester Gas Company in the local Carnival procession on July 2, was awarded second prize in the section for manufacturing industries. As will be seen, the display advertises gas refrigeration, and the scene represents an ice-field surmounted by the Aurora Borealis, with an igloo, some Esquimaux, and a polar bear.

James Keith & Blackman Company

Head Office Hampered

Owing to a fire in the premises adjoining the Head Office of Messrs. James Keith & Blackman Company, Ltd., 27, Farringdon Avenue, E.C. 4, some of their records have been damaged, and while this will unfortunately result in some delay in dealing with correspondence, &c., production at the Works is unaffected. Arrangements are in hand to deal with outstanding matters as quickly as possible, but in the meantime the Firm claim the indulgence of their many clients.

New Standard Gas Lamp Designs



The above photograph illustrates two attractive new designs of gas standard lamp recently produced by Falk, Stadelmann, & Co., Ltd. The model on the left consists of a square-section chromium-plated stem on a black wooden base with a "Spherelite" burner and enamelled gallery, while that on the right is an indirect standard with a three-tube metal stem and chromium-plated bowl, vitreous enamelled inside, and 6-light burner, fitted with by-pass. Falk, Stadelmann, & Co. now have an extensive range of floor standard lamps, of which the above two models are particularly suitable for showroom display purposes as ably illustrating the adaptability of gas.

National Gas Council

Meeting of the Central Executive Board

At a meeting of the Central Executive Board of the National Gas Council held in the Board Room at 28, Grosvenor Gardens, S.W. 1, on Tuesday, July 14, at 2.30 p.m., Sir DAVID MILNE-WATSON was unanimously re-elected Chairman of the Board for the ensuing year.

The following were re-elected Vice-Chairmen for the ensuing year:

Alderman J. H. Lloyd, M.A., J.P.
Mr. Frank Jones, M.Inst.C.E.
Mr. William Cash, F.C.A., J.P.
Councillor G. H. Kitson.

Election of Representatives of The Institution of Gas Engineers.—It was reported that the following representatives had been appointed by The Institution of Gas Engineers to serve on the Central Executive Board:

Mr. Stephen Lacey, B.Sc., M.Inst.C.E.
Col. W. Moncrieff Carr, O.B.E., T.D.
Mr. John Terrace, M.Inst.C.E.
Mr. Robert Robertson.

Co-opted Member.—Mr. R. E. Gibson, having served as a member of the Board since the inception of the Council in 1919 and now no longer representing The Institution of Gas Engineers, the Board unanimously decided to retain Mr. Gibson's valuable services by co-opting him as a member of the Board.

Re-appointment of Committees of the Council.—The following Committees of the Council were re-appointed for the forthcoming year: Emergency Executive Committee, Finance Committee, Establishment Committee, Joint Standing Finance Committee, Committee on Rating and Valuation, Consultative Committee with Coal Owners, Consultative Committee with Coke Oven Owners, Railway Station Lighting Committee.

Parliamentary.—Reports were submitted with regard to the following matters:

(*a*) The Gas Light and Coke Company (No. 2) Bill and the York Gas Bill.
(*b*) Public Health (Drainage of Trade Premises) Bill.
(*c*) Surrey County Council Bill.
(*d*) Air Navigation Bill.
(*e*) London Passenger Transport Board Bill.
(*f*) Town and Country Planning Act, 1932—
  (i.) Hendon Town Planning Scheme.
  (ii.) Proposed General Instructions by the Ministry of Health.

Measurement of Gas.—A report was submitted with regard to the proceedings before the Joint Committee of both Houses of Parliament.

It was reported that Mr. Fottrell had given evidence on behalf of the National Gas Council before the Joint Committee on July 1. The effect of the evidence was that while the Council would favour authority being given to any undertaking which desired to use a therm meter in place of existing meters, the Council was strongly opposed to any obligation being placed upon gas undertakers to install such meters.

The Report of the Joint Committee has now been issued, from which it will be noted that the decisions arrived at are as follows:

(1) That the South Metropolitan Gas Bill should be allowed to go forward.
(2) That the use of the therm meter need not be subjected to any conditions in addition to those which are imposed for its use under the South Metropolitan Gas Bill.
(3) That other Gas Undertakings desiring to use a therm meter should be authorized to do so subject to the safeguards provided in the South Metropolitan Gas Bill.
(4) That it is not expedient at the present time to introduce general legislation regarding the type of meter to be used.

Gasholders—Proposed Statutory Obligations in Connection Therewith.—A communication dated July 4 from the Chief Inspector of Factories was submitted, indicating that he was recommending the inclusion in a Factory Bill to be introduced into Parliament of provisions requiring periodic inspection of water-sealed gasholders by all Gas Undertakings.

It was decided that this letter should be referred to The Institution of Gas Engineers, with a request that a report should be submitted for consideration at the next meeting of the Central Executive Board.

Conjoint Conference of Public Utility Associations.—Reports were received from the Conjoint Conference with regard to the following matters:

(*a*) Use of Searcher Pins for the purpose of detecting gas leaks.
(*b*) Construction of Underground Chambers by Electricity Undertakers.
(*c*) Rating—
  (i.) Deputation to Central Valuation Committee.
  (ii.) Land Drainage Act, 1930. Assessment of Public Utility Undertakers to Drainage Rates.

Coal.—The steps which had been taken by the Council, the British Gas Federation, and the Conjoint Conference of Public Utility Associations with regard to the Coal Orders which were laid on the tables of the Houses of Parliament were reported, and satisfaction was expressed at the success achieved.

Consideration was also given as to the steps which would have to be taken in the future to protect the interests of Gas Undertakings.

Electricity.—The report of the Committee on Electricity Distribution which has now been published was considered, and the officers were requested to submit a detailed report for the further consideration of the Board.

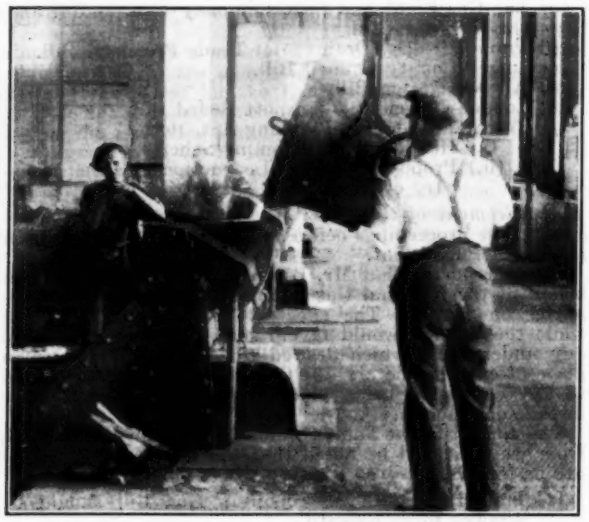
British Industries Fair—Gas Industry's Section Committee.—Mr. W. J. Sandeman and Mr. C. M. D. Belton were thanked for representing the National Gas Council on this Committee, and were re-appointed in connection with the arrangements for the 1937 Fair.

Central Gas Advisory Board.—The following representatives of the National Gas Council were thanked for their representation this year, and were re-elected for the ensuing year: Mr. Stephen Lacey, B.Sc., M.Inst.C.E., Mr. J. W. McLusky, M.I.Mech.E., Mr. C. S. Shapley, M.I.Mech.E., and Mr. S. Tagg, M.Inst.C.E., J.P.

Date of Next Meeting.—It was decided that the next meeting of the Board should take place on Tuesday, Sept. 8.

New Mechanized Centrifugal Casting Plant Increases Production of Stanton 3-in. Pipes

The first plant for the continuous production of spun pipes in one size only has just been put into operation at the Works of the Stanton Ironworks Company, Ltd., near Nottingham.



The beginning of the pipe-spinning operation—filling the tilting ladle of the casting machine from a large ladle travelling on an overhead telpher.

The object of the new plant is to secure the full measure of increased speed and efficiency offered by the centrifugal method of pipe-casting. By confining production to 3-in. diameter Stanton " New " spun iron pipes, 4 yd. long, it has been found possible to increase the speed of manufacture and at the same time to maintain the technical properties of the pipes. In addition, more economical production is effected.

Unlike the machines at the Stanton Company's larger spun plant, which are equipped for the production of pipes up to 21 in. in diameter, the machines on the new Nutbrook plant cannot make pipes of medium and large diameters. Only 3-in. standard pipes, and the " special " 3-in. pipes, sold at a low fixed price, can be produced on this plant.

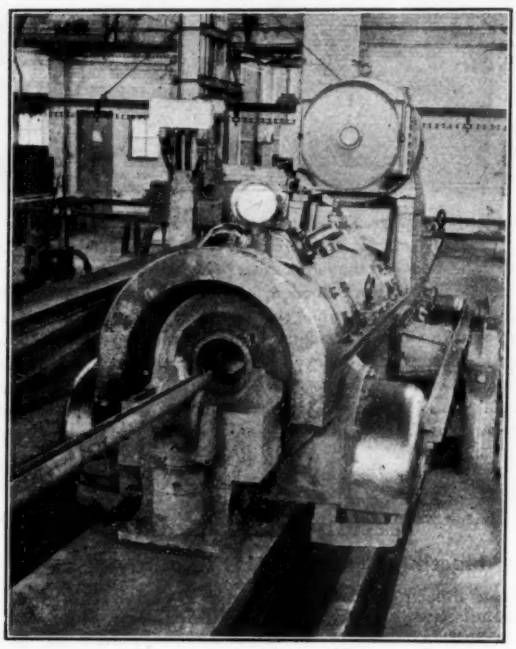
The increased production facilities are a considerable help to the Company in meeting the heavy demand for small-diameter pipes.

The plant has eight machines, six of which can be operated at the same time, capable of producing 35 miles of pipes per week. Molten metal is conveyed to the casting shop by a casting ladle, from which it is poured into tilting-ladles at the head of each machine. When a ladle is tilted, the metal runs down a cantilever trough into a revolving cylindrical steel mould, against the sides of which it is held by centrifugal force. The only sand used is that in the small core which forms the socket.

Immediately before the metal is introduced, the mould is covered with a thin deposit of ferro-silicon, which enables the pipe to cool rapidly but without chill. This operation is the chief feature of the Mairy process by which all Stanton " New " spun iron pipes are now made. The process was developed by Cochranes (Middlesbro') Foundry, Ltd., from whom the Stanton Company hold a licence.

As the rotating mould travels away from the spout of the ladle, the stream of metal forms a continuous belt of metal and produces the finished pipe. As the mould returns to its first position, the pipe is automatically stripped. It is then mechanically deposited on gantries running the full length of the shop. On these gantries the pipes travel through a normalizing furnace—a process which relieves casting strains and produces further valuable metallurgical properties.

On emerging from the furnace the pipes are fettled and allowed to cool. They are then tested by hammer blows while under hydraulic pressure. After this they are conveyed on electric conveyors to the dipping-tanks, where they are coated in a bath of tar solution. Finally, the pipes are ranged on gantries ready to be loaded into lorries or railway trucks.



View of the pipe casting machine, showing aperture through which the metal enters.

A particular feature of the plant is the extensive mechanization which has been carried out. Nearly all the handling and conveying operations are performed mechanically—an innovation which greatly assists in maintaining a high rate of production.

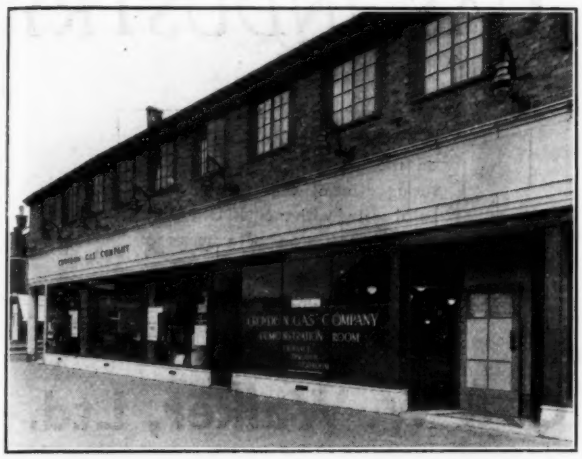
Bradford Reconstruction Scheme

In his annual report to the Bradford Gas Committee, Mr. George E. Currier, Engineer and Manager of the Bradford Gas Department, called attention to a scheme of reconstruction of the manufacturing plant.

On Nov. 22, 1935, the report runs, the Gas Committee appointed a Special Sub-Committee to consider the question of Reconstruction of Manufacturing Plant. Five schemes were submitted by Mr. Currier, and the Sub-Committee, after due consideration, decided to adopt the scheme recommended, whereby all manufacture is to be centralized at Birkshall Works. Under this scheme, Valley Road Works will be used as a Distributing Station and Thornton Road Works will not be required for Departmental purposes. This was confirmed by the Gas Committee on Jan. 31, 1936, and approved by the City Council on March 10, 1936, as also was a resolution to apply to the Ministry of Health for Borrowing Powers for the sum of £191,163. The Ministry of Health appointed Mr. F. Gregson Williams as the Inspector to hold an enquiry on May 15, 1936, in respect to the borrowing powers sought. After the enquiry, the Inspector visited the Gas-Works at Mill Street, Thornton Road, Valley Road, and Birkshall. On July 2, 1936, the Minister of Health informed the Town Clerk that the proposals were generally approved and gave sanction for borrowing powers to the extent of £100,000 on account, and intimated that further borrowing powers would be favourably considered as and when required.

Tenders have already been invited and received for ten contracts, eight of which have been accepted and recommendations made in respect of two. It is anticipated that work on the new scheme will commence in September next and that the major portion of the scheme will be completed by the end of 1937.

New Demonstration Theatre for Croydon Company's Addiscombe Consumers



Exterior view, showing the showroom and new demonstration room adjoining.

In the autumn of 1933 the Croydon Gas Company opened some very fine showrooms on a prominent site in their Addiscombe area—premises which were described and illustrated in the "JOURNAL" at the time. It was then mentioned, in passing, that a continuation of the building beyond the needs of the showroom would be let by the Company as lock-up shops.

But the Addiscombe district has been growing apace and with it, as is only to be expected where sales methods are up-to-date, the popularity of gas; and our story was continued last Christmas when we recorded in these columns that the Company had utilized both the shop premises adjoining their showrooms as a temporary demonstration room in connection with their Women's Home Advisory Service. So useful were the additional facilities thus provided, and so great the interest shown by local housewives, that the Company have now come to the conclusion that the shop premises will be of more value as part of their permanent sales service—and they have sacrificed a potential source of direct income in order to turn one of the shops into an up-to-date demonstration theatre and service centre—which, incidentally, provides an interesting sidelight upon that perennial question, "Are showrooms and demonstration rooms worth while?" or, more tersely, "Do they pay?"

The original two shops have been divided by a soundproof wall, the one next the gas showroom constituting the new demonstration theatre, a special door having been constructed to give direct access from the showroom. Although the original street door still exists, it is only utilized as an emergency exit, in this way ensuring that all visitors to the demonstration room pass right through the gas showroom and thus have the opportunity of seeing all that is displayed therein.

Modern Equipment.

The theatre has been decorated in an attractive scheme of green and primrose, and with its modern stainless steel and green canvas chairs, capable of seating more than fifty persons in comfort, it provides a very pleasing and efficient appearance. The shop window had been stippled over, also in green, with the Company's name and "Demonstration Room" rendered in gold lettering and a pointer to direct visitors to it via the showroom. At the farther end from the street is a spacious platform, fully equipped as a modern all-gas kitchen, with cabinets, enamelled-top table, built-in sink served by a small instantaneous gas water heater, an L.K.J. model refrigerator, and two cookers for demonstration purposes, as well as convenient points for the attachment of other gas apparatus that the demonstrator may desire to deal with, such as wash-boilers, irons, &c. The reason for there being two cookers is that there is in this district a fair amount of small property where the householders have for the most part uncontrolled cookers. One of the two cookers is therefore of an uncontrolled variety, while the other has, of course, the usual oven heat control. The whole room is effectively lighted by modern gas fittings, while a number of gas fires in coloured finishes are grouped at one side of the room in the form of an attractive display.

A permanent lady demonstrator is attached to the Addiscombe district, and this lady, of course, has her headquarters at the demonstration room. At the present time demonstrations are held on Tuesday afternoons in each week, while the demonstrator is always in attendance at the demonstration room every Saturday morning for personal consultation—a service which is much appreciated by consumers, who are thus able to clear up any little difficulties they may have and obtain private advice in regard to the operation of their cookers or other apparatus. It is probable that when the next winter season gets into full swing more frequent demonstrations will be held. In due course the whole district will be circularized in connection with the demonstrations, and every housewife invited to attend. The subjects of the next week's demonstrations are always announced upon a large blackboard in the showroom window.

Demonstrator's Work on the District.

When not engaged at the demonstration room, the lady demonstrator spends her time on the district calling upon consumers, either by request or as a follow-up where new appliances have been installed. A useful system has been evolved whereby the demonstrator is always kept posted in regard to her work. As a sales or hire order on the district is completed at the Head Office of the Company in Katharine Street an appropriately coloured card is filled in with particulars of the order and forwarded to the Addiscombe office for the attention of the lady demonstrator. Thus, a spontaneous request for her attendance receives priority; next come entirely new consumers; and finally consumers who have changed to a new model. These cards apply only to cookers, particulars of calls which are necessary in connection with other types of appliances being entered on different coloured cards. This is a very simple system to work and ensures that consumers receive adequate attention after installing new appliances. Furthermore, consumers get to know the lady demonstrator in their district after a little while and tend automatically to take advantage of her services.

A glimpse of the interior.

These new facilities afforded by the Croydon Gas Company in a populous and steadily growing residential area should prove of considerable benefit to all concerned and provide one more link in the chain of sales service for which that Undertaking is already well-known.

LONG SERVICE TO THE GAS INDUSTRY

A number of firms of long standing on the contracting and manufacturing side of the Industry have collaborated with the "JOURNAL" in the production of a series of articles, under the above title.

C. & W. Walker, Ltd.

In the year 1837 Charles Walker established works in Little Sutton Street, Clerkenwell, London, for the manufacture of valves and other appliances for gas-works. Subsequently the business was transferred to Donnington, Shropshire, in the year 1857, when the founder handed over the control of the establishment to his two youngest sons, Charles Clement and William Thomas, and the firm became known as C. & W. Walker. When first established, the firm employed only a score of workmen. To-day about 800 find constant employment.

The establishment of the firm at Donnington marked the opening of the great expansion of the business, and from small beginnings there sprang up in the course of only a few years a large works comprising boiler, pattern, fitting, erecting, and structural shops, saw mill, iron foundry, stores, and offices. All these have, in the course of time, been vastly extended, until to-day they occupy an area of 20 acres.

Not long after the business had been transferred from London to Donnington, Charles Clement Walker assumed control of the works, while William Thomas Walker devoted his attention to the firm's interests in London, the South of England, and Continental countries. After the death of William Thomas Walker in 1892, his brother Charles successfully carried on the business until 1897, when it was converted into a limited company, of which to-day Mr. R. J. Milbourne, J.P., Assoc.M.Inst.C.E., is Chairman and Managing Director.

By Royal Command.

C. & W. Walker, Ltd., undertake the construction and erection of complete gas-works plant, and it is interesting to record that in 1867 the firm was directed by Royal Command to design and erect a complete plant for Sandringham House, the residence of H.R.H. the Prince of Wales (afterwards King Edward VII.). During the succeeding 17 years, whenever the Prince or other members of the Royal Family were in residence, the firm were commissioned to provide an engineer to take full charge of the gas-works.

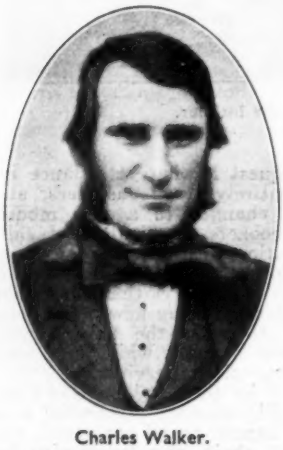
At the Donnington Works a complete gas-works was erected in 1870 for lighting the various shops and the villages of Lilleshall and Donnington, and to enable experimental research work to be carried out upon gas during its course of manufacture and purification.

The firm was early in the field in the erection of gasholders and purifiers for which they have become deservedly world-renowned. In 1890 the Gas Light and Coke Company placed an order with them for a guide-framed holder of 8 million cu.ft. capacity to be erected at Beckton. In 1912 the Australian Gas Light Company instructed the firm to design and erect at Sydney, N.S.W., a holder of no less than 12½ million cu.ft. capacity. This is the largest working holder that has been constructed in England. Holders of 1,000 to 5 million cu.ft. capacity are being made regularly, while occasionally smaller holders for gas testing plant are supplied.

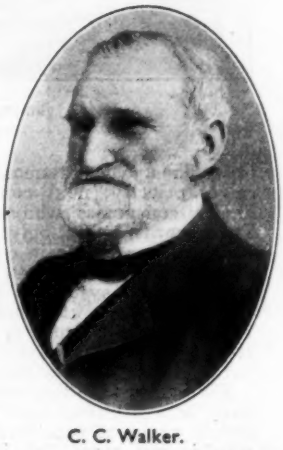
It is fitting, when touching upon this division of the firm's activities, to mention Mr. F. Southwell Cripps, Assoc.M.Inst.C.E., author of "The Guide Framing of Gasholders," a work upon which he was engaged while on the technical staff of C. & W. Walker, Ltd., and which gained him international fame.

Development of the Spiral-Guided System.

Soon after the spirally-guided gasholder was introduced, C. & W. Walker, Ltd., took a leading place in its development, and some of the largest holders of this type have been constructed by them. Those erected at Bournemouth



Charles Walker.
Founder of the Firm, 1837.



C. C. Walker.

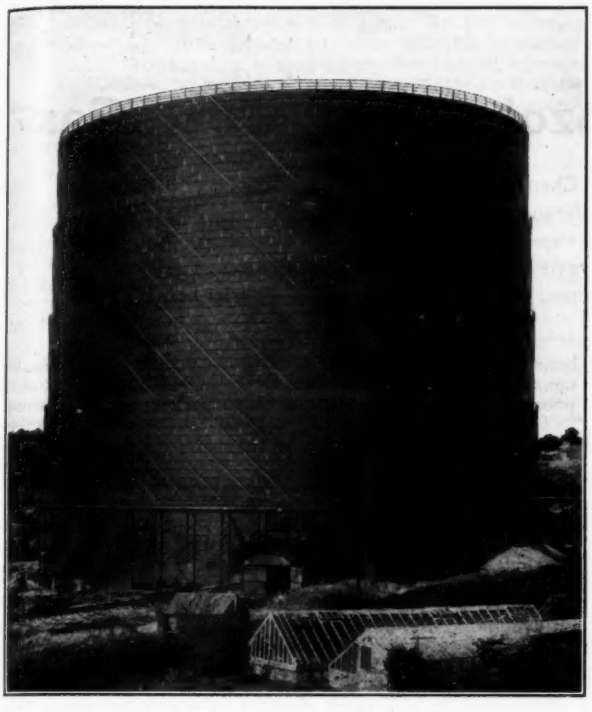
W. T. Walker.

Partners.

R. J. Milbourne, J.P.
Present Chairman and Managing Director.

and Reading have each a capacity of 5 millions, and a steel tank in connection with the former was the largest of its kind in the world.

Realizing the need for automatic lubrication, as well as provision for expansion and contraction of the floating bell in the roller carriages, Mr. R. J. Milbourne introduced his



Bournemouth—Spirally-Guided Gasholder, 5,000,000 Cu.Ft. Capacity.

well-known design for a two-roller carriage, embodying all these desiderata, which met with immediate universal approval. Strains peculiar to the crown of large holders also claimed his attention, resulting in the patenting of the Milbourne Truss, which is designed to support the crown loads in a scientific manner.

The Condition of Holders.

Until quite recently there were no ready methods by which the gas engineer could ascertain the condition of the interior of a gasholder, neither could the thickness of its sheets be conveniently ascertained unless the holder was first put out of action—a very expensive and often inconvenient operation. There have now been placed at the disposal of gas engineers two instruments by means of which this information may be obtained while the holder is in full commission. The Foster Introscope permits the interior of the holder—such parts as riveted seams, cup roller axles, &c.—to be examined in the vicinity of a hole drilled in the sheet. The Evershed Sheet Thickness Tester gives the thickness of the sheet in the vicinity of the instrument within fairly close limits of accuracy. Both instruments have been developed by C. & W. Walker, Ltd., in conjunction with Samuel Cutler & Sons, Ltd.

C. & W. Walker, Ltd., were pioneers in the design and construction of steel tanks for gasholders. In 1889 a wrought-iron annular tank of special design was erected in Rome for a single-lift holder 110 ft. diameter by 28 ft. deep. The space between the inner walls of the annular and the roof over it was arranged to be used as a store.

Purifiers.

In regard to the design and construction of cast-iron and steel purifiers, C. & W. Walker, Ltd., have consistently kept in the forefront. The Walker centre valve for controlling the flow of gas into three out of four purifiers was usually placed in the centre of the group, but a later adaptation permitted all four boxes to be used in rotation. The Week centre valve eventually displaced both the above types, and although it is many years since it was first introduced it is still specified for installations of all sizes. The better to enable purifiers to be extended in line, the Milbourne outside valve has been designed as a disc valve to the inlets and outlets of each box, while the connections are arranged alongside.

The transition from the water-luted to the luteless purifier cover marked the introduction of the Milbourne indiarubber pad, in which the indiarubber jointing is held direct to the cover by means of special eye bolts at about 9 in. pitch. A later and much improved design known as the Milbourne-Beard pad, is a development of proved merit, as it enables a worn-out pad to be replaced in a very short space of time.

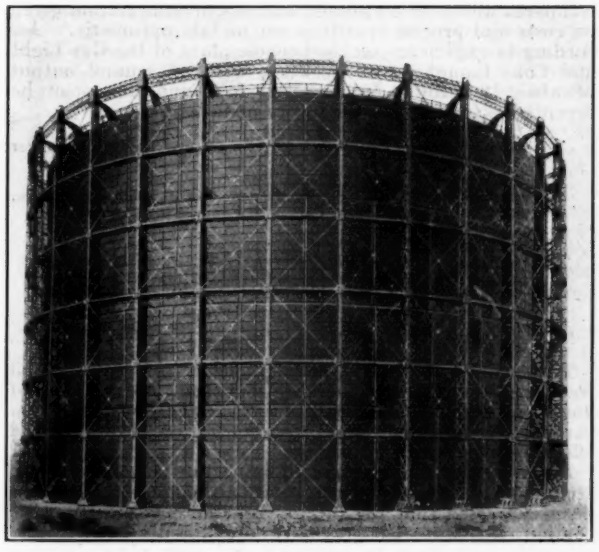
The firm also introduced the well-known Milbourne patent rapid fastener for purifier covers, which has met with general approval, Milbourne discharge shoots for overhead purifiers, and the Milbourne reverse flow valve for changing the direction of the gas stream. Many large installations of purifiers 8 and 10 ft. deep on overhead staging have been designed and erected.

Other Activities.

The firm has secured a leading place in the construction of circular oil tanks, and also rectangular tanks made up of small pressed plates which enables tanks of any size to be constructed. The quality of the workmanship and the rapidity with which tanks have been constructed have secured many repeat orders from most of the prominent oil companies.

The Mann and Walker tower scrubber is familiar to all gas engineers, and it is interesting to record that Mr. Mann (the then engineer of the City of London Gas-Works) was requested by his principal, Mr. F. J. Evans, who was then designing the Beckton Gas-Works, to co-operate with C. & W. Walker with the object of improving the efficiency of the tower scrubber then in general use for ammonia removal. It became the standard type, being adopted at Beckton, Nine Elms, and other large and important works. Recently washer scrubber efficiency has been much improved by the introduction of a series of atomizers on the Milbourne-Franks patent principle, which are applicable to existing scrubbers for the elimination of ammonia and large portion of tar fog. The well-known Walker washer scrubber embodies the principle of rough-sawn thin boards, and has been adopted in many large works. The firm's design of water tubular condensing plant able to cope with the more arduous requirements of modern vertical retort and coke oven installations, and their vertical tube and horizontal tube condenser units are examples of well-thought-out and efficient design.

The firm have consistently paid considerable attention to the by-product recovery side of gas and coke oven works. Sulphate of ammonia, Claus sulphur recovery, benzole, and sulphuric acid plants are to be found in a large number of these works. Recently, in conjunction with the Audley Engineering Company, the firm introduced a disc



Sydney, Australia—Guide-Framed Gasholder, 12,500,000 Cu.Ft. Capacity.

valve with lubricated faces which has given the utmost satisfaction. The great advantages obtainable by the adoption of electric welding have been fully taken advantage of in the fabrication of all forms of gas plant construction.

The works, as already mentioned, cover an area of over 20

acres, and the various and spacious shops contain the latest types of machinery and special machine tools suitable for the miscellaneous character of the work undertaken. The foundry is capable of turning out iron castings up to 15 tons in weight. All the shops are served by electrically-driven overhead travelling cranes, motors, and shafting. Each department is provided with compressed air and hydraulic services, and both high and low pressure gas are used for lighting the shops. It has always been the firm's practice not to send any work away until it has first been assembled wholly or in sections in the works at Donnington. This method provides clients with opportunities of making a thorough examination of the work if desired, and ensures accurate and rapid erection at the site.

The Recovery of Benzole from Coal Gas

by
W. G. ADAM
and
G. W. ANDERSON

Before the Chemical Engineering Congress of the World Power Conference W. G. Adam and G. W. Anderson delivered a Paper, an extract of which is given below, in which they reviewed the present position of benzole refining and discussed in detail recent technical developments.

The overall steam consumption of the active carbon process for the recovery of benzole is kept at a relatively low figure (30 lb. per gallon of crude benzole) which compares well with that of most existing oil-washing plants, although it must be admitted that to-day the difference between a carbon and a modern oil-washing plant is not nearly as great as it was when the carbon process was first introduced. Its principal attraction lies in the fact that the benzole produced is free from wash-oil and yields a distillate of 95% below 120° C.

A high extraction efficiency is easily maintained even under adverse temperature conditions which have less influence on the carbon than on the oil-washing process. It also possesses the incidental advantage of removing a large proportion of the organic sulphur compounds in the gas (about 70% as against 40-60% in oil-washing plants), which is of considerable importance to the Gas Industry.

The inability of the carbon process to treat any but purified gas may be a definite drawback in the coking industry, but not in the Gas Industry, where gas is always purified. The freedom of the gas from naphthalene and its associated unsaturated hydrocarbons (indene, chrysene) would seem to be less essential than it has been believed to be.[1] Several carbon plants erected on the Continent serve the dual purpose of extracting naphthalene and benzole, and evidently operate quite satisfactorily under these conditions.

It has been stated[2] that capital and labour costs of carbon plants are lower than for oil-washing plants of the same size, but it is doubtful whether this statement is of general application. However, the total cost of production usually compares well with oil plants, and recent information given on costs and process results is not unduly optimistic.[3] According to experience on the benzole plant of the Gas Light and Coke Company, at Beckton, with an annual output of about 3 million gallons, the following data can be accepted as a fair basis for future installations:

Depreciation	5–10% on capital cost (allowing for obsolescence).
Repair and maintenance	3–4% on capital cost.
Consumption of carbon	60 lb. per 1,000 gall. of crude benzole.
Consumption of process steam	30 lb per gall. of crude benzole.
Consumption of steam for gas boosters (included in above)	3 lb. per gall. of crude benzole.
Consumption of power (electric)	0·175 unit per gall. of crude benzole.
Consumption of feed water (economizers)	1·5 gall. per gall. of crude benzole.
Consumption of cooling water	0·25 gall. per gall. of crude benzole.
Labour	0·15d. per gall. of crude benzole.

The composition of the actual benzole (on the wash-oil free basis) varies considerably between one plant and another. It depends on factors such as (1) the type of coal carbonized, (2) conditions of carbonization, (3) type and efficiency of extraction process.

Recent years have witnessed important changes in the technique of benzole refining, and although the view has been expressed that the process has thereby become more complicated, these changes have undoubtedly been of considerable advantage to producer and user alike, because they were prompted in the first instance by a more complete understanding of the relative value of certain of the constituents of motor benzole. The result has been the introduction of processes such as the inhibitor process, which have as their object the conservation of the unsaturated hydrocarbons present in crude benzole which had been previously lost owing to the nature of the refining methods then practised. The producer has benefited by the increased yield of refined spirit so obtained, while the motor benzole itself has been enriched by the presence of a valuable constituent. As will be seen later, however, these modern processes brought fresh problems in their train, and whereas the acid washing process, the principle of which had been first established by Mansfield, in 1847, in which year he patented a process[4] for the recovery of benzene from coal tar, could be applied to any crude benzole with the assurance that a satisfactory product would be obtained, the refining process nowadays is often a combination of several processes depending upon the nature of the crude benzole to be treated. The introduction of a process such as the active carbon process for the recovery of benzole from coal gas, which claims as one of its advantages the removal of objectionable organic sulphur compounds from the gas, has not tended to make the task of the benzole refiner easier, as these sulphur compounds find their way eventually into the crude benzole.

Although it has been claimed at different times that engines have been run successfully on crude spirit, and even fore-runnings, without serious ill-effect, at least upon the engine, such isolated examples cannot alter the fact that benzole for general use as a motor fuel must have been refined in such a manner that the objectionable sulphur compounds are no longer present to any extent. Commercial considerations such as competition and public opinion demand that colour and odour shall be consistent and as free from objection as possible, while it is obvious that any compounds present in the benzole which are unstable on storage should either be removed during the refining process or treated in such a manner as to render them innocuous. Such are the main reasons for refining crude benzole, and while there are others, represented by the remaining clauses of the standard specifications regarding distillation range, specific gravity, crystallizing point, freedom from acids, &c., these latter present little or no difficulty to the refiner, and for that reason need not be discussed at length.

The inhibitor process has solved the problem of rendering a benzole, containing unsaturated hydrocarbons, stable on storage, while problems relating to poor colour stability or bad odour, if they arise, are often solved by a closer application to the details of the refining process or, if this fails, by the introduction of a simple expedient such as a mild acid wash to improve colour stability, or treatment of the finished benzole by the hypochlorite process to overcome objectionable odour. Bad odour has been known to result from the formation of reduction compounds of carbon disulphide,[5] but can be overcome by prompt and efficient removal of the latter. This brings us to what is nowadays the most important problem in benzole refining—viz., the reduction of the sulphur content of the benzole to bring it within the specification limit of 0·4% by weight. The main sources of the sulphur in crude benzole are carbon disulphide and thiophen, and the relative proportions of these two substances control to a considerable measure the course of the refining operations. The earlier practice of washing the benzole with concentrated sulphuric acid, although removing the unsaturated hydrocarbons, served a very useful purpose in so far as the thiophen content was eliminated at the same time, so that with the removal of some of the carbon disulphide as forerunnnings during the final distillation, the benzole easily conformed to the specification.

With the discarding of the acid-washing process, however, the problem of sulphur removal became more acute, and in the absence of a satisfactory alternative method for the removal of thiophen, the position was reversed, and the refiner had to seek some means of completely removing

the carbon disulphide content of the benzole. Several processes, details of which will be given later, are avilable for this purpose, and provided the thiophen content of the benzole is not too high, no further treatment for sulphur removal is necessary, but should the thiophen content be so great as to make it impossible to produce a benzole conforming to the specification without further treatment, it will be necessary to acid-wash, if not the whole, at least a certain proportion of the benzole in order that the mixed product shall be of the correct quality. In the presence of unsaturated hydrocarbons it is often possible to remove sufficient of the thiophen with comparatively small amounts of 80-85% sulphuric acid, thus avoiding too great a washing loss.[6] Such, in brief, is the present position of benzole refining, and recent technical developments can now be discussed in detail.

Governed by Quality.

Any decision regarding the actual steps in the refining process will be governed mainly by the quality of the crude spirit to be treated. The introduction of modern efficient stripping plants and the development of the active carbon recovery process have resulted in an improvement in the quality of the crude benzole, as shown by the virtual absence of wash-oil and heavy ends, thus often enabling the "once running" process to be discarded. If the benzole is to be treated by the inhibitor process, it will be advisable to wash with dilute sulphuric acid and dilute caustic soda solution at this stage. Crude benzoles do exist which are practically free from pyridine bases and phenols, but usually washing is carried out either because it is essential or, if the content of bases and phenols is very low, to enable the correct amount of inhibitor to be subsequently added. Crude benzoles which are to be subsequently washed with concentrated sulphuric acid should be freed as soon as possible from hydrogen sulphide if it is present, as treatment with the strong acid will deposit free sulphur, which distils over into the final benzole.[7] Hydrogen sulphide is easily removed by a wash with dilute caustic soda solution. Reverting again to the technique of the inhibitor process, the next stage will comprise some means for removing the carbon disulphide content of the benzole. At present this can be accomplished either by very efficient fractionation or by some chemical process such as the methanol-soda or the ammonium polysulphide, introduced by the National Benzole Association and the Yorkshire Distillers, Ltd., respectively. At Beckton, efficient fractionation is favoured, and for this purpose a Barbet unit was installed in 1933.

The Barbet still[8] is used very successfully in Europe and America for the production of many substances boiling in a narrow temperature range. Briefly, the plant consists of two continuous stills built up of cast-iron sections and trays with bubble hoods, and reflux condensers on each still. The first still separates out the concentrated forerunnings containing approximately 25% carbon disulphide, and gives a residue of crude benzole containing a maximum of 0·02% of carbon disulphide. The volume of the concentrated forerunnings and their carbon disulphide content materially depend on the carbon disulphide content of the original benzole, but the former is usually about 4-5% of a crude benzole containing 1·25% carbon disulphide. The second still gives the motor benzole fraction and bottoms containing the xylenes and higher boiling constituents of the benzole. There is no difficulty in separating the benzole content of the forerunnings by fractional distillation, and the carbon disulphide is then obtained of 40-50% strength in admixture with saturated and unsaturated hydrocarbons of boiling point close to that of carbon disulphide. In either of the above forms the material is suitable for treatment by a chemical process for recovery of the carbon disulphide, or the redistilled carbon disulphide fraction may be burned directly for the production of sulphuric acid. At Beckton the steam consumption on the Barbet unit is 9 lb. per gallon of crude benzole, and of this quantity approximately 2¼ lb. is used on the first still separating the concentrated forerunnings. As a method of removing carbon disulphide the process is thus very economical and highly efficient.

The Chemical Process.

Turning now to the chemical processes for removal of carbon disulphide, the Methanol-Soda process owes its development to the research staff of the National Benzole Company—*i.e.*, Messrs. Hoffert, Claxton, and Hancock, and is covered by patents.[9] In a Paper[10] describing the work leading to this patent, they acknowledge the assistance, in carrying out trials, of the Staffordshire Chemical Co. (1917), Ltd., and through the courtesy of Messrs. S. Henshaw and C. J. Ridout of that Company the following particulars of the process as practised at their works during the past year are given.

The ordinary benzole washers are used and a once-run benzole is treated after a caustic soda wash. The requisite amount of methanol is added to the benzole in the washer, and is followed by the slow addition of solid flake caustic soda, agitation being continued throughout. After 3 hours, a quantity of water, equal in volume to that of the methanol, is added and the agitation continued for 15 minutes. Settling for 30 minutes is allowed, and the xanthate solution is then run off. The spirit is washed for 15 minutes with a volume of water equal to that previously used, settled, and the wash water drained off and added to the xanthate liquor. The benzole is now ready for distillation. The xanthate liquor is neutralized in a separate closed horizontal steel tank fitted with an agitating device and cooling coil, a safety valve and thermometer pocket being also provided. 25% sulphuric acid, supplied from an overhead tank, is used to neutralize the liquor. The acid is added slowly, the temperature being maintained below 80° F. by means of the cooling coil. During neutralization, noxious gases are evolved, hydrogen sulphide in particular. The emission of such gases can be reduced to a minimum by neutralizing the xanthate solution as soon as possible after preparation, as it decomposes on storage, with the result that the evolution of hydrogen sulphide during neutralization is considerably increased. These gases are drawn off from the neutralizer by means of a steam ejector and passed through three absorbers containing respectively weak caustic soda solution, anthracene oil, and water, and then through a cooling coil to an iron oxide purifier. Between the absorbers and the oxide purifier is an explosion box, and inserted in the pipe line are gauzes before and after the absorbers. The anthracene oil is used as a catch for carbon disulphide vapours and saturates to about 12%. The neutralized xanthate solution is now pumped to the still for recovery of the carbon disulphide and methanol.

The still used for this purpose is of exactly the same type as a refined benzole still and is provided with three receivers: (1) for carbon disulphide; (2) for recovered methanol (90% strength or over); and (3) for intermediates. Distillation is commenced slowly into No. 1 receiver until the specific gravity of the distillate is about 1·150. This fraction is chiefly carbon disulphide with a little methanol. To remove the latter the distillate is passed through a water seal in the receiver. At 1·150 specific gravity the distillate is turned into No. 3 receiver until the specific gravity is about 0·850, which is the commencement of the methanol fraction. This fraction is collected in No. 2 receiver until the specific gravity of the distillate is 0·900. From 0·900 to 1·000 specific gravity the distillate is collected in No. 3 receiver.

Practically Water White.

The carbon disulphide recovered is practically water white, has a specific gravity of 1·240, and is of 90% purity. The yield is about 60% of the quantity removed from the benzole. The methanol recovered in receiver No. 2 is about 80% of the original volume and is of 90% strength or over, and is ready for re-use in the process. The intermediate fraction contains about 30% methanol in solution with a little carbon disulphide and benzole. This methanol represents 5-6% of the original quantity used, making the total recovery about 85% (*cf.* Wikner and Richardson[11]). This intermediate fraction is added to the next still charge together with the water layer used as a seal in the carbon disulphide receiver. The distillation of the 1,500 gallons still charge of neutralized xanthate solution takes about 12 hours, and on the present scale of operations about two still charges are worked per week. Any noxious gases evolved during distillation are removed by a steam ejector and absorbed in the same manner as during the neutralization process.

During the year ended Oct. 31, 1935, the Staffordshire Chemical Company treated 885,000 gallons of once-run benzole by this process, the average sulphur content of which in the form of carbon disulphide was 0·72%. After treatment this figure was reduced to 0·09%, so that carbon disulphide equivalent to a sulphur content of 0·63% had been removed from the benzole. Over the period mentioned, the cost of working the process was as follows:

	Per Gallon per 0·1% S Removed. d.
Chemicals	0·046
Steam, labour, laboratory, stores	0·022
Depreciation and interest	0·009
Total	0·077

The foregoing figures cover a period during which a certain amount of experimental work was carried out in order to establish the most favourable conditions, and this no

doubt influenced the cost of chemicals, which is the reason why this cost is slightly higher than that given by Wikner and Richardson. They also include a charge for laboratory services and stores, and as these items were not shown by Wikner and Richardson the overall cost in the two cases cannot be directly compared. From Wikner and Richardson's figures one would have expected the total cost in the present instance to have been of the order of 0·05d. per gallon per 0·1% S removed, so that, all things considered, there is very little difference. The cost of treating benzole by this process will decrease as the carbon disulphide content of the benzole increases, but against any saving consequent upon the treatment of forerunnings must be set the cost of their separation, and, unless exceptionally good fractionation is possible, it would appear that treatment of the whole benzole fraction is the better course. The process is not a pleasant one to carry out, but, provided due care is taken to prevent leakages and some form of purifying system for the exit gases is adopted, the nuisance from bad odours should not be excessive.

The Other Method.

In the other method practised in England for the removal of carbon disulphide from benzole,[12] the benzole is freed from carbon disulphide and free sulphur by treatment with a reagent containing polysulphides of ammonia in which there is present ammonium disulphide and free ammonia, and preferably also ammonium monosulphide, in certain proportions. The reagent is made by mixing the requisite quantity of sulphur with a fixed amount of a 15% solution of ammonia and treating with hydrogen sulphide in a quantity insufficient to combine with all the ammonia. An equivalent amount of a 30% solution of ammonia can be employed if desired, and the resulting solution diluted to double its original volume before use in the process. Either once-run crude benzole or refined benzole can be treated by this process, and with the latter there is no harmful effect upon the colour of the spirit. A countercurrent effect is obtained during the washing of the benzole by using the partially spent reagent from the second wash of a previous batch as the first wash on the next batch. The washing treatment is carried out at ordinary temperatures in the usual benzole washers. The average washing period is 30 minutes, but will vary slightly according to the efficiency of agitation. The treated benzole is afterwards washed, first with a used wash water and finally with fresh water, the wash waters being mixed with the spent reagent unless required for re-use. The spent reagent is distilled to recover carbon disulphide and the ammonia and hydrogen sulphide liberated are absorbed in water and mixed with the sulphur which is obtained from the aqueous still residue. By this means the reagent is regenerated, and it only remains to adjust its composition to the standard formula by the addition of fresh sulphur and ammonia to replace the amount lost, which loss may be due in part to the formation of ammonium thiocyanate, as this compound is recovered from the still residues after removal of the deposited sulphur. The carbon disulphide and the ammonium thiocyanate are recovered in a form in which they can be sold.

From information kindly supplied by Major C. G. Lyon and Mr. S. Billbrough, of Yorkshire Tar Distillers, Ltd., the following additional facts concerning the process are now available. The process has been used for the past two years, and it has now been extended to other refiners within a radius of fifty miles, so that it is now being applied during the production of 6 million gallons of motor benzole per annum. At present the reagent is made and regenerated by the Yorkshire Tar Distillers, Ltd., only, who supply it in bulk to other refiners and collect the spent reagent for regeneration. Thus the user has neither the trouble, expense, nor risks of regeneration. Benzoles with S as CS_2 as low as 0·3% are being economically treated by the process. Settlements are extremely clean and rapid, and so far no corrosion difficulties have occurred, while the colour and neutrality of the spirit are quickly restored by water washing if refined spirit has been treated. For a refiner who takes fresh reagent from the Yorkshire Tar Distillers, Ltd., and returns the spent material to them for regeneration, the only extra plant required will be storage tanks for the reagent and wash liquors. Then, when operating on the current standard terms for the supply of the reagent, including delivery, the cost of reducing the S as CS_2 content of a benzole from 0·5% down to an average of 0·05% will be of the order of 0·153d. per gallon of benzole. This is equivalent to 0·034d. per gallon of benzole per 0·1% S removed.

Supplies of Reagent.

The question of supplies of the reagent for the ammonium polysulphide process would doubtless be met by the establishment of production centres in various districts. This process possesses also, from the user's point of view, the merit of simplicity, although in this respect it hardly approaches the fractionation method. The crude benzole must, of necessity, be distilled at least once, so that a process which permits of the simultaneous removal of carbon disulphide possesses added attraction. Simplicity of operation is not the only factor to be considered, however, and the final choice of a particular process will be governed mainly by local conditions. Consideration of the costs given for the ammonium polysulphide and methanol-soda processes suggests that the separation of carbon disulphide from forerunnings containing 20% of this compound would hardly be profitable by the latter process, although a far more attractive proposition by the former method, especially as the reagent would be more efficient under such conditions. The cost of chemicals alone would probably dispose of any suggestion for the treatment of a 40% carbon disulphide fraction by either process. The exact conditions for the treatment of such concentrated fractions, however, would first require investigation.

Having been freed from carbon disulphide and provided the thiophen content is sufficiently low, the benzole can be treated with the inhibitor, subject, of course, to redistillation if a chemical process has been used for removal of the carbon disulphide. It is advisable to add the inhibitor either during the distillation of the benzole or as soon afterwards as possible, and for this reason the practice at Beckton is to add the correct amount of inhibitor continuously to the motor benzole fraction leaving the Barbet still. In Great Britain a mixed inhibitor of cresol and catechol is favoured as imparting not only resistance to gum formation, but also improved colour stability to the spirit. The inhibitor process[13] has progressed far beyond the experimental stage in this country, as is shown by the fact that at present over two-thirds of the motor benzole produced is refined by users of the process. The amount of inhibitor added to the motor benzole is of the order of 0·05%, depending upon the nature of the spirit, since as little as 0·03% will often suffice, a 10% solution of catechol in cresol being generally used. The process has given general satisfaction since its introduction about six years ago.

Should the thiophen content of the benzole be sufficiently high to necessitate acid washing, various modifications of the latter process can be suggested, among them the Ufer process. Briefly, this consists of treating the benzole in the usual manner with strong acid, but after treatment and while the spirit and acid are still being agitated together, a given quantity of water is added to the washer. By this means the resins and occluded spirit previously lost in the acid tar are returned to the benzole, from which the former are recovered in the residue on distillation, in which form they can be mixed with tar or creosote. A clean dilute acid is separated from the benzole and is suitable for pyridine extraction or the manufacture of sulphate of ammonia. The spirit is washed with a solution of soda ash before distillation. The process has been in use at Beckton since 1928, and experience has shown that the conditions of working vary considerably with different benzoles, so that it is difficult to lay down specific instructions for carrying out the process. Experiments must be made to determine the optimum conditions for strength of acid, &c., for a particular type of benzole. The first experiments at Beckton were carried out with sulphuric acid of specific gravity 1·805, but it was found that commercial oil of vitriol could just as easily be used. Yields of washed spirit as high as 99% were obtained by the Ufer process compared with 95% by the old acid-washing process. The overall recovery of finished motor benzole is also greater, but the difference here is not quite so marked owing to the increased residue obtained from the spirit refined by the Ufer process. Thiophen is removed by this process and the motor benzole obtained is of very good quality and comparable with spirit refined by the old process. Coke oven benzoles in general appear to be less amenable to treatment by the Ufer method, while it is interesting to note that the presence, in the spirit to be treated, of a certain amount of solvent naphtha is advantageous, as it appears to assist solution of the resins in the benzole. It can be easily separated during fractionation of the washed spirit. An important feature of the Ufer process is the almost complete absence of acid tar and the necessity for its disposal.

According to information recently published,[14] considerable advance has been made in the application and efficiency of the Instill process for benzole refining. Improvements in the medium have also been effected[15] which, it is claimed, enable thiophen to be reduced with less loss than when a similar reduction is effected by means of strong sulphuric acid.

For many reasons the old method of washing with concentrated sulphuric acid is still indispensable in the production of pure products such as pure benzole, toluene, and xylene, but with motor benzole there will be a bright future

for the first process introduced for the removal of thiophen in a simple and economic manner without simultaneous removal of unsaturated hydrocarbons.

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Discussion.

Mr. H. GRIFFITHS, referring to the comparisons made in the Paper, said it was necessary that comparisons between systems of benzole extraction should be on an equal basis and there must be strict comparability of conditions. The feature of the activated carbon process was that it enabled high extraction to be achieved and the efficiency of extraction was increased without any increase in the cost of operation. With other processes, the higher the extraction was pushed the greater was the specific cost of energy for the process. The essential feature of the activated carbon process was the carbon replacement cost. It should be borne in mind, however, that this process was constantly being improved and the qualities of carbon now available were very much better than those available a few years ago. It should be realized that the complete removal of naphthalene and the reduction in organic sulphur content was of very great financial importance. The importance of this both from the point of view of domestic utilization and for industrial purposes had been realized and a plant had recently been put down for the purification of town gas which had previously passed through an oil wash benzole extraction plant but the purification was primarily directed towards the removal of organic sulphur and the result showed a decrease from 25-30 grains per 100 cu.ft. to below 5 grains. This had proved to be quite easy and an economic possibility and although it was possible to reduce the sulphur content still further, it meant additional cost.

Mr. G. CLAXTON (National Benzole Company) said that in Great Britain approximately 30 million gallons of benzole were stabilized by the use of inhibitors every year. Benzole of all types had been treated and there had not been a single complaint of gum formation. A similar success had been achieved in the United States where in 1935 more than 1,500 million gallons of "cracked" petrol were treated. As pointed out by Messrs. Adam and Anderson, so far as benzole refining was concerned, the only practical limit to the use of the inhibitor process was the total sulphur content of the crude benzole. In this country benzole producers worked to a strict sulphur specification. Although carbon disulphide could be removed with only small losses of product, sulphuric acid was still the only practical means of removing thiophen sulphur. When this latter was high it was sometimes necessary to give such extensive treatment with acid that the addition of an inhibitor was no longer necessary. With all other benzole, however, only a light treatment with acid of about 80% strength was required in order to remove colour. After removal of phenols and redistillation, the inhibitor was added and a perfectly stable, water white benzole was produced with a considerable saving of chemicals and of yield. He was particularly interested in the account given by Messrs. Adam and Anderson of the three methods of removing carbon disulphide from benzole but was a little disappointed that no costs had been given for the operation of the Barbet column, although some costs had been given for the Yorkshire Tar Distillers process, and also all the costs for the methanol-soda process. It appeared, however, that when the costs due to capital, labour, and laboratory control were added to the costs for the Yorkshire Tar Distillers process, and when capital costs and the cost of the forerunnings lost in the Barbet column were entered against the process, there would be little to choose between the operating costs for the three processes and choice between them would, therefore, be largely governed by local circumstances. The Barbet column, for example, being continuous, would be most suited to a works having a constant throughput of crude of a fairly constant composition and he imagined that ample supplies of cooling water would be needed. The Yorkshire Tar Distillers process commended itself to a small works within easy distance of a plant producing the reagent, while the methanol-soda process had found application on works handling very varying crude in districts where the Yorkshire Tar Distillers reagent would not in any case be available. In mentioning the methanol-soda process it was necessary to correct any impression that this in any way was specially liable to produce bad odours. The oxide purifier on the plant at Chatterley had been in operation for over 18 months without renewal. When operating on crude benzole there must be an evolution of hydrogen sulphide from the Barbet column and this had, indeed, been put forward as an advantage of the column. Had the Authors any information as to what precautions were necessary for absorbing the uncondensed vapours from a Barbet plant operating at a works where a foul gas main was not available for disposal of these vapours? The Authors were fortunate in being able to add the inhibitor to their active carbon benzole without any chemical treatment. He had been under the impression that active carbon benzole, in particular, was liable to contain hydrocyanic acid which did not appear to be a desirable constituent of motor fuel. Was this constituent removed by distillation through the Barbet column and if so what steps were taken to prevent its escape into the atmosphere?

Mr. W. H. HOFFERT (National Benzole Company) said that with the considerable increase in gas-works benzole he was doubtful whether some of the benzoles produced could be refined successfully to pass the well-known acid wash test. New processes, however, had been developed which enabled these benzoles to be refined without difficulty and with comparatively small losses. The biggest problem was the separation of sulphur and although a number of processes had been developed for removing the carbon disulphide, each with their advantages and disadvantages, there still seemed some difficulty in disposing of the recovered crude carbon disulphide after it had been separated. A year or two ago it was calculated that the amount of carbon disulphide to be recovered from benzole produced in this country was of the order of 300 to 500 tons per annum and perhaps the quantity to-day was larger. In view of the quality of carbon disulphide imported, the difficulty of its disposal was surprising. However, even if a suitable market could be guaranteed for crude carbon disulphide, the fact remained that, particularly in the case of a small works, it would be more an embarrassment than otherwise owing to its volatile character. In the case of such a works the ideal would be to be able to convert the carbon disulphide into a harmless product which could readily be disposed of.

Physical Constants of Pure Metals

A considerable number of physical constants of pure metals have been determined during the past fifteen years at the National Physical Laboratory, Teddington. The results have now been collected, and are published in a pamphlet* in a convenient form for reference.

Part I. of the pamphlet contains data for some specially pure metals which have been prepared in the course of researches at the Laboratory. The metals are iron, chromium, manganese, beryllium, cadmium, magnesium, and tin, and tables are also included giving the surface tensions of liquid metals, and the lattice parameters of various metals.

Part II. contains results obtained on metals of known high purity procured from external sources. Data are given for melting points, latent heats of fusion, specific heats, thermal conductivities, and coefficients of expansion. The results of measurements made in other institutions have, in many instances, been included, thus bringing together results which are later than those contained in the International Critical Tables.

* "Physical Constants of Pure Metals." H.M. Stationery Office, London, price 6d. net.

Crewkerne Showrooms Opened

Sir Francis Goodenough's Remarks

Opening new Gas Showrooms on July 17 at Crewkerne (a Subsidiary Company of the South-Western Gas and Water Corporation), Sir Francis Goodenough, C.B.E., the Vice-Chairman of the Corporation, said that he was interested to see that the electrical industry was being threatened with compulsion to do what the Gas Industry had been doing voluntarily for some time past—namely, linking up the smaller undertakings in such a way that all the subsidiary companies would get the advantage of the knowledge and experience of those engaged in larger fields in the industry, both technical and administrative. This should, and would, result in better service at lower cost to the public generally—the supreme object in view of all concerned with the administration of the larger holding corporations.

Sir Francis said that he was more than ever assured, after nearly fifty years' experience in the Gas Industry, that there was a great field for that Industry in the service of the public in a country that had next to no water or native oil resources on which to rely for light and power. Gas was now more than ever "the fuel of the future."

The Institution of Gas Engineers

RESULTS OF 1936 EXAMINATIONS

The undermentioned Candidates were successful in the 1936 Examinations in Gas Engineering and Gas Supply of The Institution of Gas Engineers, held under the Education Regulations of The Institution of Gas Engineers, as approved by the Government Education Departments of Great Britain and Ireland, and the City and Guilds of London Institute.

The Results do not include Candidates (*a*) who withdrew before the Examination, or (*b*) who, having Second Class Certificates, re-sat and failed to secure First Class Certificates, or (*c*) whose Examination has not been completed.

Appended is the Report of the Board of Examiners on the 1936 Examinations.

J. R. W. ALEXANDER,
Secretary.

28, Grosvenor Gardens,
London, S.W. 1.
22nd July, 1936.

Comparative Statistical Schedule of the 1935 and 1936 Examination Results.

Examinations.	1935.					1936.				
	First Class with Distinction.	First Class.	Second Class.	Failed.	Total.	First Class with Distinction.	First Class.	Second Class.	Failed.	Total.
External—										
Diploma in Gas Engineering (Manufacture)	..	2	4	3	9	..	4	4	1	9
H.G. Gas Engineering	..	3	12	7	22	..	13	15	7	35
O.G. Gas Engineering	..	3	20	13	36	..	4	14	14	32
O.G. Gas Engineering (single subject)	..	..	..	..	..	..	..	..	..	..
Diploma in Gas Engineering (Supply)	..	..	..	..	..	..	1	..	..	1
H.G. Gas Supply	..	3	7	7	17	2	4	7	8	21
O.G. Gas Supply	1	6	12	7	26	2	4	16	5	27
O.G. Gas Supply (single subject)	1	6	2	..	9	..	3	2	..	5
Internal—										
H.G. Gas Engineering	..	10	21	23	54	1	23	27	17	68
O.G. Gas Engineering	1	12	22	17	52	2	9	22	14	47
O.G. Gas Engineering (single subject)	..	3	..	..	3	..	3	1	..	4
H.G. Gas Supply	3	18	32	13	66	2	18	18	19	57
O.G. Gas Supply	13	30	55	19	117	9	26	55	36	126
O.G. Gas Supply (single subject)	1	22	3	..	26	4	8	2	2	16
Total	20	118	190	109	437	22	120	183	123	448

EXTERNAL CANDIDATES (93).

Diploma in Gas Engineering (Manufacture) (8).

Class.	Name.	Town.	Subject of Thesis.
First	Facer, A.	Bristol	"Some Aspects of Unaccounted-for Gas in Relation to Modern Practice."
,,	Moys, H.	London	"The Preparation and Handling of Coke."
,,	Pickard, A.	Knottingley	"The Technical Control of a Small Undertaking."
,,	Symon, F. G.	Coatbridge	"Carbon Dioxide in Relation to Producer Gas Control."
Second	Corrin, C. R.	Onehan	"Benzole Recovery on a Small Works with Special Consideration of the Position with Regard to Supplies of Raw Materials and Sale of Products."
,,	Derbyshire, J. A.	Shipley	"The Colloidal System of Feed Water Treatment and Factors Influencing Waste Heat Boiler Performance."
,,	Fillery, E. J.	Newark	"A System of Automatic Control to Maintain the Declared Calorific Value."
,,	Jones, S.	Blackpool	"An Investigation of the Extraction of Carbon Dioxide from Coal Gas."

Higher Grade Certificate in Gas Engineering (28).

Class.	Name.	Town.
First	Banner, G. E.	Margate
,,	Birks, H. E. S.	Goole
,,	Brake, N. T.	Bexhill-on-Sea
,,	Canning, T. H.	Thorpe Bay
,,	Chambers, E. P. T.	London
,,	Clapham, T. W.	Bristol
,,	Fitton, G.	Stroud
,,	Hartley, A. G.	Blackpool
,,	Horner, A. S.	Wallasey
,,	Laird, N.	London
,,	Martindale, J. R.	Bristol
,,	Rimmer, G. J.	Hinckley
,,	Shilson, A. C.	Weston-super-Mare
Second	Blogg, C. R.	Croydon
,,	Donnelly, R. P.	Richmond
,,	Dukes, J. A.	London
,,	Foston, R. H.	Torquay
,,	Howgate, D. K.	Wolverton
,,	McDougall, T.	Galashiels
,,	Meggitt, K. B.	Bedford
,,	Petch, G. H	Southampton
,,	Riches, N. F.	East Grinstead
,,	Sharp, K. W. B	Huddersfield
,,	Taylor, W. R.	Rotherham
,,	Topping, J.	Preston
,,	Vince, D. A.	Swindon
,,	Whitehurst, F. L.	Cheadle
,,	Young, C. A.	Shrewsbury

Ordinary Grade Certificate in Gas Engineering (18)

Class.	Name.	Town.
First	Buchanan, I. P. J.	Wellington, N.Z.
,,	Downing, C. N.	Lowestoft
,,	Green, J. H.	Barnoldswick
,,	Shillington, T. F.	Helen's Bay
Second	Baxendale, J. de V.	Bingley
,,	Burke, C. E.	Belfast
,,	Clayton, R. S.	Hereford
,,	Hindle, C.	Nelson
,,	Kennett, G. S.	Braintree
,,	Kenworthy, H. W.	Matlock
,,	Midgley, J. W.	Pinxton
,,	Richards, B. D.	Brighton
,,	Ruggles, R. C.	Leighton Buzzard
,,	Stevenson, J.	Leek
,,	Thorne, W. L.	Rhondda
,,	Tunnicliff, K.	Malvern
,,	Westmacott, M. H.	Sunningdale
,,	Wright, L. S.	Stoke-on-Trent

Diploma in Gas Engineering (Supply) (1).

Class.	Name.	Town.	Subject of Thesis.
First	Rea, A. C.	Perth	"The Bulk Supply of Gas with Reference to Neighbouring Undertakings."

Higher Grade Certificate in Gas Supply (13).

Class.	Name.	Town.
First	Fitton, G.	Stroud
,,	Foster, D. A.	Wellingborough
,,	Hemingway, C W.	Featherstone
,,	*Jones, S. T.	Falkirk
,,	*Murray, G. F. J.	Plymouth
,,	Speers, J. A.	Preston
Second	Barralet, C. E.	Petts Wood
,,	Black, E. W.	Leyton
,,	Crosby, G. H.	Bristol
,,	Field, E. B.	Blackburn
,,	Manning, C. W.	Bristol
,,	Nichols, F. W.	Plymouth
,,	Pearson, C. H.	Southampton

* With Distinction.

Ordinary Grade Certificate in Gas Supply (22).

Class.	Name.	Town.
First	Findon, W. H. C.	Sandown
,,	Foston, R. H.	Torquay
,,	*Horner, A. S.	Wallasey
,,	Johnson, W. H.	Holyhead
,,	Naylor, H.	Halifax
,,	*Smith, J.	Workington
Second	Aitken, R. A.	Montrose
,,	Beaver, C. W. J.	Bristol
,,	Blake, C. G. N.	Bournemouth
,,	Blowers, F. J.	Lowestoft
,,	Derbyshire, K.	Malvern
,,	Draper, T. G.	Horley
,,	Easthope, F B. A.	Southsea
,,	Gillespie, A. V	Dublin
,,	Groom, R. D.	Southport
,,	Groves, A. E.	Clapham
,,	Kenworthy, H. W.	Matlock
,,	Moorley, T. E.	Windsor
,,	Roach, A. V.	Liverpool
,,	Thomas, E. C.	Portsmouth
,,	Utting, L. H.	Norwich
,,	Waugh, H.	Maryport

* With Distinction.

Ordinary Grade (Single Subject) Examinatian in Gas Supply to qualify to sit for the Diploma Examination in Gas Engineering (Manufacture) (3).

Class.	Name.	Town.
First	Balsom, S. E.	Wrexham
,,	Gaskarth, J.	Liverpool
,,	Woodcock, J. A.	Manchester

INTERNAL CANDIDATES (227).

Higher Grade Certificate in Gas Engineering (51).

Class.	Name.	Centre.
First	Bairstow, R.	Wrexham
,,	Balsom, S. E.	,,
,,	Bates, E.	Manchester
,,	Brown, A.	Kirkcaldy
,,	Cadwallader, W. D.	Birmingham
,,	Cook, G. R. T.	Leeds
,,	Deacon, V. H.	Birmingham
,,	Duckworth, F.	Regent Street
,,	Gorman, E. F.	Sir John Cass
,,	*Harvey, F.	Birmingham
,,	Hathaway, W. L.	,,
,,	Livingstone, T. B.	Glasgow
,,	Matthews, N.	Manchester
,,	Mitchell, A. A.	Edinburgh
,,	Napier, T. P.	Kirkcaldy
,,	Norton, R. L.	Regent Street
,,	Ormrod, A.	Manchester
,,	Price, L. P.	Plymouth
,,	Richmond, E. H.	Sir John Cass
,,	Ricketts, T. S.	Regent Street
,,	Roberts, T. W.	Birmingham
,,	Stokes, S. H.	Huddersfield
,,	Tilley, J. G.	Birmingham
,,	Weston, P. S.	Bath
Second	Boothman, F.	Burnley
,,	Butlin, W. N.	Birmingham
,,	Cowper, J.	Kirkcaldy
,,	Cox, C. P.	Regent Street
,,	Cox, G. J. B.	Newcastle-upon-Tyne
,,	Davison, D. W.	Edinburgh
,,	Geddes, W. R.	Manchester
,,	Keene, C. J. P.	Regent Street
,,	Keillor, H. G.	Glasgow
,,	Lewis, D.	Manchester
,,	Longhurst, R. S.	,,
,,	March, J. D.	Bath
,,	Mear, N.	Huddersfield
,,	Northen, B.	Sir John Cass
,,	Pask, W. A.	Manchester
,,	Phillips, G. T.	Birmingham
,,	Preston, W.	Bradford
,,	Rees, D. W.	Cardiff
,,	Renshaw, A. K.	Manchester
,,	Roberts, R. O.	Wrexham
,,	Shipley, T. W. E.	Derby
,,	Stacey, J. W.	Sheffield
,,	Sutcliffe, W.	Newcastle-upon-Tyne
,,	Tidball, F. N.	Birmingham
,,	Thomas, A. L.	Cardiff
,,	Wardle, B. W.	Derby
,,	Wilson, J.	Bradford

* With Distinction.

Ordinary Grade Certificate in Gas Engineering (33).

Class.	Name.	Centre.
First	Fender, B.	Westminster
,,	Gaunt, D.	Bradford
,,	Gaunt, J. G.	Leeds
,,	Hamilton, G.	Edinburgh
,,	*Hamshaw, M.	Bradford
,,	Hogley, C. A.	Huddersfield
,,	Lord, J. K.	Manchester
,,	Passmore, H. G.	Birmingham
,,	Robson, F. L.	Bradford
,,	Royden, G.	Glasgow
,,	*Simpson, O. J.	Birmingham
Second	Angles, D. B.	Edinburgh
,,	Coates, H. R.	Manchester
,,	Crossley, F.	,,
,,	Daniels, F. R.	,,
,,	Farnworth, K.	,,
,,	Gibson, E.	,,
,,	Heycock, D. J.	Cardiff
,,	Mountain, C.	Leeds
,,	Munro, G.	Glasgow
,,	Munslow, K. J.	Birmingham
,,	Nauen, J. A.	Westminster
,,	Nicholls, P. N.	Birmingham
,,	Pierce, S.	,,
,,	Pitt, R. J.	,,
,,	Stapley, H. G.	Manchester
,,	Stubbs, J. A.	Wrexham
,,	Swindley, J. H.	Cardiff
,,	Vose, G. E. D.	Birmingham
,,	Waterhouse, J.	Huddersfield
,,	West, D. E.	Cardiff
,,	Whitehouse, R. S.	Birmingham
,,	Woodward, R.	Leicester

* With Distinction.

Ordinary Grade (Single Subject) Examination in Gas Engineering to qualify to sit for the Diploma Examination in Gas Engineering (Supply) (3).

Class.	Name.	Centre.
First	Clarke, H. G.	Westminster
,,	Coltman, R. F.	,,
,,	Muggleton, H. H.	,,

Higher Grade Certificate in Gas Supply (38).

Class.	Name.	Centre.
First	Bate, A. R.	Birmingham
,,	Davison, R. P.	Newcastle-upon-Tyne
,,	Denham, J.	Huddersfield
,,	Emrys-Roberts, G. W.	Westminster
,,	Fisher, M. R.	Leicester
,,	Foot, J. A. A.	Westminster
,,	Hedges, H. R.	,,
,,	*Hetherington, A. F.	,,
,,	Ireland, N. W.	,,
,,	Kerley, G. E.	,,
,,	Malsbury, J.	,,
,,	Maylam, J. B.	,,
,,	Parnall, W. M. K.	,,
,,	Porter, W. H. B.	Newcastle-upon-Tyne
,,	Rendell, D. C.	Westminster
,,	St. Leger, A. A.	,,
,,	Tilley, J. G.	Birmingham
,,	Turner, G. O.	Westminster
,,	White, J.	Birmingham
,,	*Williams-Thompson, R. B.	Westminster

Second	Andrewes, N. A.	Westminster
,,	Blenkiron, A.	Bradford
,,	Brookes, J. T.	Westminster
,,	Brookhouse, R. N.	Leicester
,,	Denoon, J. R.	Edinburgh
,,	Haslock, R. C.	Bradford
,,	Healy, D. E.	Westminster
,,	Hunt, J. R.	Birmingham
,,	Lynch, W. J. H.	Westminster
,,	Mann, L. V. S.	Birmingham
,,	Ronca, J. G.	Westminster
,,	Rose, W.	Glasgow
,,	Salmon, J. C.	Westminster
,,	Sayer, W. H.	,,
,,	Sidaway, F. W.	Birmingham
,,	Taylor, L. N. J.	Westminster
,,	Taylor, N. R.	Birmingham
,,	Yates, J. W.	Westminster

* With Distinction.

Ordinary Grade Certificate in Gas Supply (90).

Class.	Name.	Centre.
First	Angles, D. B.	Edinburgh
,,	Buckley, J. A.	Westminster
,,	Bullock, H. G.	,,
,,	Buxton, R. W. C.	,,
,,	*Catley, G.	Huddersfield
,,	Chapman, E.	Westminster
,,	Chater, R. A.	East Ham
,,	*Claxton, G. F.	Westminster
,,	*Claydon, S. E.	Birmingham
,,	Cuttle, J. C.	East Ham
,,	Doust, C.	Westminster
,,	*Garnham, D. W.	,,
,,	Goldsmith, F. G.	East Ham
,,	Groves, D. F. W.	Westminster
,,	Hamer, E. J.	,,
,,	*Hamilton, G.	Edinburgh
,,	Henderson, N.	Manchester
,,	Houston, W. T.	Westminster
,,	*Humphrey, G. W.	Hull
,,	Jarman, E. F.	East Ham
,,	Laidlaw, J. A. M.	Westminster
,,	Linell, T. H.	Birmingham
,,	Livingstone, T. B.	Glasgow
,,	Marson, E. H.	Westminster
,,	*Medhurst, W. E.	South East London
,,	Munro, G.	Glasgow
,,	O'Neill, R. H.	Newcastle-upon-Tyne
,,	Porter, B. G.	Westminster
,,	Riley, H. P.	,,
,,	Roberts, P. J.	,,
,,	Royden, G.	Glasgow
,,	*Sansom, W. H.	Westminster
,,	Skilleter, H. E.	East Ham
,,	*Thompson, H. J.	Tunstall
,,	Wardle, F.	Birmingham
Second	Adkins, H. B.	Birmingham
,,	Allan, H.	Dundee
,,	Armstrong, J. B.	Leeds
,,	Ashton, P. C.	Westminster
,,	Barrett, E. M.	Wandsworth
,,	Brewer, F. J.	Westminster
,,	Brown, F. A.	Wandsworth
,,	Burch, G. A.	Westminster
,,	Burton, H. K.	Leicester
,,	Butler, C. W.	Birmingham
Second	Carpenter, F. C.	Westminster
,,	Clarke, F. F. G.	,,
,,	Cook, J. B.	Wandsworth
,,	Commercial, L. G.	Westminster
,,	Court, E. R.	,,
,,	Easterbrook, A. G. S.	Wandsworth
,,	Evans, J. H.	Birmingham
,,	Fendom, L.	,,
,,	Glass, J. S.	Westminster
,,	Glover, S. J.	Cardiff
,,	Harris, C.	Westminster
,,	Hart, H. R.	,,
,,	Heasman, H. V.	,,
,,	Henderson, R.	Dundee
,,	Henrys, R. E.	Westminster
,,	Hillier, P. S.	,,
,,	Hoskins, G. T.	,,
,,	Jones, D.	,,
,,	Mance, W. H.	,,
,,	March, R. W.	Wandsworth
,,	Meir, J. D.	Tunstall
,,	Meiszner, W. H.	East Ham
,,	Molison, A. G.	Westminster
,,	Mollison, A. J.	,,
,,	Nicholson, W. G.	,,
,,	Norrie, F. B.	Dundee
,,	Oldroyd, J.	Newcastle-upon-Tyne
,,	Penfold, G. C.	Wandsworth
,,	Perriss, C. E.	Westminster
,,	Perry, A. J. V.	,,
,,	Richards, R. P.	,,
,,	Riley, H. M.	Tunstall
,,	Rogers, C. A.	Wandsworth
,,	Shaw, F. B.	Huddersfield
,,	Smith, W. C.	Birmingham
,,	Spencer, C. J. A.	Westminster
,,	Stringer, H.	,,
,,	Stubbings, W. H.	Huddersfield
,,	Tandy, C. W.	Westminster
,,	Wallis, S. P. J.	,,
,,	Walters, P. H.	,,
,,	Warrick, P. J.	,,
,,	Wildblood, J.	Tunstall
,,	Willetts, H.	Birmingham
,,	Wilson, J. F.	Dundee

* With Distinction.

Ordinary Grade (*Single Subject*) *Examination in Gas Supply to qualify to sit for the Diploma Examination in Gas Engineering* (*Manufacture*) (12).

Class.	Name.	Centre.
First	Bairstow, R.	Liverpool
,,	*Calvert, N.	Westminster
,,	*Duckworth, F.	,,
,,	Edwards, C. H.	Liverpool
,,	*Fielder, H. L.	Birmingham
,,	Hateley, R. N.	,,
,,	Hathaway, W. L.	,,
,,	Lewis, D.	Manchester
,,	Millington, H.	Liverpool
,,	Mountain, C.	Leeds
,,	Richmond, E. H.	Westminster
,,	*Roberts, T. W.	Birmingham

* With Distinction.

1936 REPORT OF THE BOARD OF EXAMINERS

The Board of Examiners has pleasure in submitting to the Gas Education Committee, for presentation to the Council of The Institution of Gas Engineers, its Report on the 1936 Examinations held under the Education Regulations of the Institution, as approved by the Government Education Departments of Great Britain and Ireland and the City and Guilds of London Institute.

During the year 1935-36, the members of the Board of Examiners and the Assessors appointed by the Council were :—

Major Courses.

Examiners: Robert Robertson, M.Inst.C.E. (Bristol)—Chairman; J. M. Campbell, J.P. (Margate), T. Carmichael, M.Inst.C.E., M.I.Mech.E. (Portsmouth), E. Crowther, M.Eng., A.M.Inst.C.E. (Salford), Dr. E. W. Smith, C.B.E. (London), and F. H. Vince (London)—Gas Engineering. W. A. Bishop (Croydon), S. B. Chandler, A.M.I.Mech.E. (London), J. G. Clark (London), W. Dieterichs (London), H. R. Hems (Birmingham), and E. F. Keable (Great Yarmouth)—Gas Supply.

Assessors: England and Wales: J. R. Bradshaw, B.Sc.Eng. (West Hartlepool)—Gas Engineering; S. B. Chandler, A.M.I.Mech.E. (London)—Gas Supply. West of Scotland: David Fulton (Helensburgh) and John W. McLusky, M.I.Mech.E. (Glasgow)—Gas Engineering and Gas Supply. East of Scotland: J. Jamieson (Edinburgh) and J. W. Napier (Alloa)—Gas Engineering and Gas Supply.

Minor Courses and Gas Fitting Courses.

Examiners: E. Crowther, M.Eng., A.M.Inst.C.E. (Salford)—Gas Works Practice; E. F. Keable (Great Yarmouth)—Gas Supply Practice; W. Dieterichs (London) and T. V. Garrud (London)—Gas Fitting; W. E. Harrison (Birmingham)—Elementary Science.

ROBERT ROBERTSON,
Chairman,
Board of Examiners.

J. R. W. ALEXANDER,
Secretary,
The Institution of Gas Engineers.

28, Grosvenor Gardens,
London, S.W. 1.
24th June, 1936.

The work submitted for the 1936 Examinations in Gas Engineering and Gas Supply was generally good, and in most Grades the average standard was higher than in 1935. There was, however, a general lack of practical experience; members of the Institution are urged to provide adequate facilities for the acquisition of such experience. An improvement was noticeable in the sketches submitted by the External Candidates in Ordinary Grade Gas Engineering, the External Candidates in Ordinary Grade Gas Supply, and by some Internal and External Candidates in Higher Grade Gas Supply. In the other Grades, however, the sketching was mainly poor and still needs attention.

Gas Engineering—Ordinary Grade.

In the Examination for the Ordinary Grade Certificate in Gas Engineering, the work of the Internal Candidates was of fairly high standard, although in many cases the Answers were spoilt by being badly written and untidy. In most cases freehand sketches were poor, but those made with instruments were, on the whole, reasonably good.

Although the general knowledge displayed by External Candidates was weak and the presentation of such knowledge was not of a particularly high order, the general standard of the 1936 Examination Papers in Ordinary Grade Gas Engineering was higher than in 1935. Many Answers indicated that the Questions had not been carefully read before being attempted; important omissions were made and Answers were carelessly expressed or sketched. On the whole sketches were better than in recent years.

Gas Engineering—Higher Grade.

The work submitted by the Internal and External Candidates for the Higher Grade Certificate in Gas Engineering was of a higher standard than of recent years, particularly in respect of those Questions dealing with principles and processes. Many of the Answers dealing with constructional work and operation of plant were unnecessarily long and involved. Sketches in most cases were not good, and were frequently omitted when they might have been used with advantage.

Gas Engineering (Manufacture)—Diploma Grade.

Whilst the syllabus for the Examination for the Diploma in Gas Engineering (Manufacture) is admittedly wide, it should be possible for a higher general standard to be attained. Sufficient use was not made of sketches and simple numerical representations. Although the Answers to the Question on the Gas Engine showed that this subject had been studied by Candidates, the heat balance was still imperfectly understood.

Gas Supply—Ordinary Grade.

The work submitted by the Internal Candidates for the Ordinary Grade Certificate in Gas Supply was generally of a fairly high standard. Sketches frequently were poor, but improvement was shown by some Students.

The knowledge shown by External Candidates was of a high standard and indicated that the subjects were understood. Sketches were mostly above the usual standard.

Gas Supply—Higher Grade.

The work of the Internal and External Candidates for the Higher Grade Certificate in Gas Supply was generally satisfactory and of a slightly higher standard than in 1935. The Questions, however, should be read carefully before being attempted, to ascertain exactly what Answer is required. In many cases the sketches were excellent, particularly those of the refrigerator, but special attention to sketching is still required.

Gas Engineering (Supply)—Diploma Grade.

There was only one Candidate for the Diploma in Gas Engineering (Supply).

Minor Course Certificates in Gas Works Practice and Gas Supply Practice.

The Report of the Examiners of the City and Guilds of London Institute on the Examinations for Minor Course Certificates in Gas Works Practice and Gas Supply Practice indicates that generally the Questions were understood. The Answers to the Questions on Gas Supply Practice compare unfavourably with the work in recent years, although the average marks over all the Questions in both Gas Works Practice and Gas Supply Practice were good. Sketching still needs more attention, it being important that Students should be trained to sketch only those parts which are vital to the Question and to express themselves in shorter terms. The Answers to the Question on the Gas Engine were again disappointing. The reactions of oxygen with carbon were well understood, but very few candidates appreciated the importance of the steam reaction in a producer. More attention should be given to the Subject of coke grading.

Gas Fitting Certificates.

The Report of the Examiners of the City and Guilds of London Institute on the 1936 Examinations in Gas Fitting indicates that the number of entries has been maintained. The percentage of successes in the Final Grade has increased from 73 per cent. in 1935 to 83 per cent. in 1936.

Dewsbury Explosion Inquest

Occurrence Remains a Mystery

"Death by Misadventure" with no evidence to show the cause of the accident was the verdict returned at the inquest at Dewsbury, on July 17, on the three victims of the explosion at the Dewsbury Corporation Gas-Works on June 18. The jury found that no blame was attaching to anyone.

The dead men were: J. Gledhill (40), Works Superintendent, and his cousin, S. Gledhill (43), coal man, whose bodies were recovered from the debris of the wrecked meter house, and H. Hinchcliffe (42), foreman stoker.

The Deputy West Riding Coroner (Mr. S. H. B. Gill) was accompanied by Mr. L. C. McNair (Inspector of Factories from the Home Office), Mr. C. H. Taylor (District Inspector of Factories), and Mr. J. Picken, an Inspector of the Ministry of Health. The Town Clerk (Mr. Holland Booth) represented Dewsbury Corporation, and there were also present Mr. H. L. Bateman (Gas Engineer), the Chief Constable (Mr. F. E. Pritchard), Mr. A. E. Thompson (representing the relatives of J. Gledhill), and Mr. E. Morrish (representing the relatives of S. Gledhill). Mrs. Hinchcliffe was not legally represented.

Joseph Rhodes, coal man, said that on the morning of the explosion he, the Gledhills, and Hinchcliffe were cleaning a governor in the meter house. Feeling the effects of gas he suggested to S. Gledhill, with whom he was working, that they "should go out for a breather." They had left the meter house only about a minute, and were sitting on the meter house steps, when there was an explosion. He and S. Gledhill were non-smokers; he believed that J. Gledhill was also a non-smoker. There were no naked lights in the meter house.

Raymond Marshall, gas-works mechanic, said he was amazed when on examining the inlet valve on the governor on June 26 he found it 4½ turns open.

Mr. H. L. Bateman (Gas Manager) said that when it was decided to clean the governor he told J. Gledhill he wanted him to stand by and see that the inlet and outlet valves were closed properly. He also said that there must be no lights, and that the manhole covers were to be put on before turning on again. So far as he knew, all the meter house plant was in good order.

Referring to the fact that the inlet valve was found to be open 4½ turns, Mr. Bateman said this would let in a great amount of gas. Had the valve been open when the men were working they would have been overcome. He knew of no reason why the valve should have been open, other than to put the governor into action after the manhole covers had been replaced. He had no knowledge of how the valve came to be open, or of how the escaping gas became ignited.

The Deputy Coroner: If the inlet and outlet valves had been closed there would have been no danger?

Mr. Bateman: Definitely no. None at all.

In further evidence, Mr. Bateman said that the Corporation Gas Committee had approved his recommendations for duplicating the inlet and outlet valves as a precautionary measure for the future. It had been arranged, also, that a certificate should be given by someone in authority that everything was in order before operations were undertaken.

The Deputy Coroner, addressing the jury, said no regulations, so far as could be ascertained, had been broken. No doubt existed that the explosion occurred owing to the inlet valve being opened, for what reason nobody knew. There did not seem to be any blame attaching to any person, unless it was one of those who was killed; but they could not say definitely what had happened. They could not even say who opened the valve.

It was added by the Deputy Coroner that it would probably never be known what was the actual cause of the explosion.

Athletic and Social

South-Eastern Gas Companies' Tennis Tournament

The results of the first round of the South-Eastern Gas Companies' Lawn Tennis Tournament, which is held annually among Gas Companies in the south-eastern counties, were as follows:

East Kent beat Sheppey 7—1 (one match undecided).
Sittingbourne beat Maidstone 5—4.
Dover beat Folkestone 8—1.
Hastings beat Tunbridge Wells 5—4.

The second round is being played off this month, and the results will be announced in the "JOURNAL" in due course.

OPTIONAL
PREPAYMENT METER

OUTSIDE VALVE BOX

EVERY PART INTERCHANGEABLE

MADE BY

THE PIONEERS

OF THE SLOT METER

SAWER & PURVES
(BRANCH OF METERS LIMITED)

RADFORD ROAD
NOTTINGHAM

DERBY ROAD
WATFORD

MILES PLATTING
MANCHESTER, 10

Gas Undertakings' Results

Berwick.

The annual report of the Berwick and Tweedmouth Gas Company states that during the past year the sales of gas increased by 7%. A sum of £600 has been transferred to general reserve, £400 to retort bench maintenance account, and £500 to street maintenance, and there remains a balance of profit of £2,459. The amount available for distribution is £3,715, and the Directors recommend the payment of a dividend of 5½%, free of income-tax, leaving £1,565 to be carried forward.

Bradford.

The report by the Engineer and Manager, Mr. G. E. Currier, upon the Bradford Gas Department for the year ended March 31, 1936, states the gross income for the year amounted to £451,935, and the gross expenditure to £389,096, showing a gross profit of £62,839. After providing for the following net revenue charges: Interest on loans, &c., £21,918, contributions to sinking fund, £11,253, and income-tax £8,543, there is a net profit on the year's working of £21,125. In comparison with the figures for the preceding year, the gross income is increased by £21,177, and the gross expenditure by £25,510, while the net revenue charges are less by £2,871. The net profit of £21,125 compares with £22,587 earned during the preceding year. The total sales of gas for the year have been 1,947,668,000 cu.ft. as compared with 1,880,418,000 cu.ft. in 1935, an increase of 67,250,000 cu.ft., or 3·57%. The increase in output is due partly to the operation of the Two-Part Tariff. The total quantity of gas made was 2,092,553,000 cu.ft., as compared with 2,030,389,000 cu.ft. during the preceding year, being an increase of 62,164,000 cu.ft., or 3·06%. The unaccounted-for gas was 6·92%. The total receipts from residuals are £80,034, or £9,440 more than last year, an increase equal to 1·163d. per 1,000 cu.ft. New mains and services and repairs and maintenance of mains and services have entailed the expenditure of £29,982 on revenue account, and £3,937 against capital account; the revenue charge being £2,630 more than during 1935, due to additional work to old mains and services and to extra work and expense involved in dealing with broken mains during the severe winter frosts. During the year 7,403 yd. of mains, chiefly of small sizes, have been laid, and 1,482 new services have been installed. The payment received from the Finance and General Purposes Committee for Street Lighting is £51,649, as against £51,058 in 1935, or an increase of £591, this payment being based on the scale which operated last year.

Carlisle.

The annual report of the Engineer and Manager of the Carlisle Gas Department, Mr. J. E. Blundell, M.Inst.C.E., for the year ended March 31, 1936, states that the sale of appliances at the showroom still continues on the up-grade, and shows an increase of 11·52% over the corresponding period 1934-35. The year 1934-35 showed an increase of 27·92% over 1933-34. A total of 2,725 appliances was fixed during the year. The deliveries of coal, as last year, have been uninterrupted, and the average price per ton paid this year is 19s. 10d., as against 19s. 6d. for the previous twelve months. During the year new mains have been laid to the various housing estates within and without the City, and the total main mileage is approximately 149. The quantity of gas made and sold continues to increase. The daily, weekly, monthly, and yearly output records have all been surpassed this year. The gas made during 1935 was 642,076,000 cu.ft. and gas sold 600,884,110 cu.ft. The figures for 1936 are 665,511,000 cu.ft. and 622,279,323 cu.ft. The yield of coke and breeze—23,099 tons, against 21,465 tons for the preceding year—is equal to 13·10 cwt. per ton of coal carbonized, and the quantity sold—15,578 tons—has realized £11,487, an increase of £1,153 over last year's sales figure. The financial results for the year, after providing for income-tax, loans repayments, &c., show a net profit of £5,204, as against a net profit of £4,634 for the preceding twelve months.

Heywood.

The annual report of the Engineer and Manager, Mr. G. W. Broughton, of the Borough of Heywood Gas Department for the year ended March 31, 1936, states that the gross revenue amounted to £34,169, and the gross expenditure (less interest and sinking fund) to £23,640, leaving a gross profit of £10,529; and including £8,665 interest, sinking fund, and income-tax, a net profit of £1,864, as against a profit last year of £739. The total quantity of gas manufactured was 790,933·5 therms, of which 17,910 therms was carburetted water gas. The total sales of gas amounted to 685,112·97 therms, a decrease of 2·33% on the previous year. The quantity of coke and breeze sold was 3,907 tons as against 2,297 tons in 1935, while the net receipts show an increase of £791. The receipts from tar are £47 more than in 1935. The demand for modern appliances of all types continues, and the volume of business carried through at the showroom is as follows: 115 cookers, 67 hotplates, 35 fires, 80 wash-boilers, 53 water heaters, 156 irons, and 290 lighting units. In addition to the above the amount of business done at the Exhibition held in October last was 33 cookers, 16 fires, 11 wash-boilers, 7 water heaters, 6 gas irons, and 10 lighting units.

Jedburgh.

The annual meeting of the shareholders of Jedburgh Gas Company, presided over by ex-Bailie Laidlaw, was held on July 10, when a dividend of 6¼%, less income-tax, was declared. The financial statement showed that the quantity of gas sold during the year amounted to 15,878,800 cu.ft., this being an increase of 1,304,100 cu.ft., the rate charged being 5s. per 1,000 cu.ft.

Smethwick.

The annual report of the Smethwick Gas Committee for the year ended March 31, 1936, states that the amount of coal carbonized was 44,988 tons as against 44,571 tons in 1935. The coal gas made was 4,037,297 therms or 897,177,200 cu.ft., against 3,948,861 therms or 877,524,600 cu.ft. in 1935. The gas sold and accounted-for was 3,927,412 therms or 872,758,200 cu.ft., an increase of 25,956,800 cu.ft. or 3·07%. The income for the year was £183,376, working expenditure £139,740, leaving a gross profit of £43,633, against £42,663 last year. The net profit was £17,872, against £16,021 last year. The cost of manufacture is lower than last year despite an increase in the price of coal; and the volume of gas sold to the consumer per ton of coal carbonized ranks among the best records obtained in this country. During the year a portion comprising one-half of the vertical retort installation has been reconstructed on the upwardly heated system. The Department are now in a position to state that the higher efficiencies claimed for this process have been achieved, and the Contractors' guarantees fulfilled. The consumption of gas is higher than last year by 3·07%, but as indicated in last year's report efforts to expand are seriously handicapped by the development of housing schemes outside the Borough.

Stoke-on-Trent.

The Chief Engineer and General Manager's (Mr. A. Mackay, M.I.Mech.E.) annual report on the Stoke-on-Trent Gas Department for year ended March 31, 1936, states that the past year has again resulted in another record year to the Undertaking. The quantity of gas delivered from the Works was 6·54% in excess of last year. The total gas delivered has now passed the 2,000 million cu.ft. per annum mark, the increased consumption being chiefly due to the heavier demands for industrial and commercial purposes, also to the extended requirements on the domestic side of our business. The total quantity of coal gas, &c., made and coke oven gas received since Sept. 16, 1935, are as follows: Coal gas (vertical and horizontal) 1,591,591,000 cu.ft., carburetted water gas 132,748,000 cu.ft., and coke oven gas purchased 368,711,000 cu.ft., making a total of 2,093,050,000 cu.ft. This is an increase of 128,523,000 cu.ft. over last year. The improved yield of 8·80 cwt. of coke rendered for sale against 8·38 cwt. can be considered satisfactory, for this figure is exclusive of rough and fine coke breeze, which, if taken into account, would raise the final result to 10·33 cwt. per ton of coal. The total quantity of crude benzole produced during the year was 359,646 gallons against 399,560 gallons last year. The reduction in total gallons is entirely due to the decrease in coal carbonized and to the loss of a small quantity of benzole by the reduced manufacture of carburetted water gas. The total quantity of concentrated ammonia liquor manufactured during the year was 1,880 tons against 1,684 tons for 1935, an increase of 196 tons. The number of consumers has increased by 1,285 during the year, the total now standing at 68,684. The consumption per consumer is 27,280 cu.ft. against 26,481 cu.ft. last year. Street lighting accounted for a consumption of 78,793,000 cu.ft. against 75,654,320 cu.ft. last year—an increase of 3,138,680 cu.ft. Domestic gas appliance sales amounted to £40,999 compared with £34,577 for the preceding year.

Stratford-upon-Avon.

The annual report of the Engineer and Manager of the Stratford-on-Avon Gas Department, Mr. F. Shewring, for the year ended March 31, 1936, states that the increased sale of gas is the highest yet attained in any single year; the net profit constitutes a record, a new section of the Works has been erected, and the Glover-West vertical retort installation has been completed and put into commission. Sales of apparatus continue to progress, and the Department are solidly developing the hot-water load. Gas sales increased by 11,850,800 cu.ft., equal to 8·5%. Gas unaccounted-for is 5·5%, against 5·4%. The gross profit for the year is £5,888, against £2,872, an increase of £3,016. The net profit is £2,741, against £240. Carbonization, £11,149, against £13,837, a decrease of £2,688, due to less coal being used and a small saving in stokers' wages. Purification costs are down by about £92, although more gas was purified. Repairs and maintenance costs, £1,606, against £2,630, a saving of over £1,032. Street lighting expenditure is £888, an increase of £353. Eighteen additional lamp columns were erected during the year and various lighting improvements carried out. General rate fund received £650, the same as in the previous year. Sales of gas increased by £1,266. Cooker and meter rents are up by £49. Revenue from coke is down by £1,439. Less coal being carbonized, the production of coke is consequently lower. Tar sales are lower by £214, less tar being manufactured. Fittings realized £2,893, against £2,655, an increase of £238.

Gas Markets and Manufactures

Stock Market Report

(For Stock and Share Lists, see later pages)

The Account which closed last week was one of the heaviest for some time past, the increase in business being attributable to a large extent to the Government's re-armament programme, and speculation was rife in all classes of shares likely to benefit therefrom, notably iron, steel, and engineering issues. British Funds remained firm, closing fractionally higher, while home rails, though quiet, were steady and a few registered small gains. The industrial section was again the centre of activity, and decreases in value were almost conspicuous by their absence. The current Account is one of the three-week variety covering the August Bank Holiday and part of the summer holiday season, so that some cessation in the existing activity is probable and in some quarters a consequent adjustment of values.

The Gas Market had another good session, the number of recorded transactions being even heavier than during the previous week, and, though prices were well maintained, very few quotations were altered. In the London List British 5% debenture (redeemable Dec. 31, 1951) moved up 5 points to 112½; North Middlesex gained 3 to 174½; and Alliance and Dublin hardened 2½ to 162½. The latter is 20 points up on last year's highest price, which is partly due to the increase of 6s. 3d.% in the dividend paid for the last half of 1935, and also doubtless, in view of the Company's progress, to the hopes of a return to the 7⅞% per annum paid for the years 1928 to 1931. The Portsmouth new 5% preference was marked down to the more normal level of 118-123, though no business in the Official List has yet been recorded in this stock. There were two small increases in the Supplementary List, and the only change in the Provincial Lists was the recovery in Bristol ordinary from the *ex* div. reduction a fortnight ago.

At the time of writing there is a fairly plentiful supply of gas stocks on offer, and among these the following may be of interest: £26,000 Lea Bridge new 4% preference (2 months' dividend payable in September) is available at 106 yielding £3 15s. 6d.%; £10,000 Wandsworth new 4% preference (5 months' dividend payable in September) at the same price; £1,000 Swansea 5% maximum stock at 109 yielding £4 11s. 8d.%; and £5,000 Commercial ordinary at 98½ giving a return of £5 1s. 6d.%.

The Directors of the Brighton, Hove, and Worthing Gas Company announce their intention to offer for sale by tender £50,000 4% preference stock at a minimum of £105 10s.%, yielding at this price £3 15s. 10d.%.

Current Sales of Gas Products

The London Market for Tar Products.

July 20.

There are no changes to report in the tar products market, prices remaining at about the following levels:

Pitch, 35s. to 36s. per ton f.o.b.

Creosote, about 5¼d. per gallon.

Refined tar, 3¾d.

Pure toluole, about 2s. 4d.; pure benzole, 1s. 7d. to 1s. 8d.; 95/160 solvent naphtha, about 1s. 7d.; and 90/160 pyridine, about 4s. 3d. to 4s. 6d.—all per gallon naked at makers' works.

Tar Products in the Provinces.

July 20.

The average prices of gas-works products during the week were: Gas-works tar, 19s. 3d. to 24s. 3d. Pitch—East Coast 33s. to 35s. 6d. f.o.b. West Coast—Manchester, Liverpool, Clyde, 33s. to 35s. 6d.* Toluole, naked, North, 1s. 10½d. to 1s. 11d. Coal-tar crude naphtha, in bulk, North, 8d. to 8¼d. Solvent naphtha, naked, North, 1s. 4d. to 1s. 4½d. Heavy naphtha, North, 1s. 1½d. to 1s. 2½d. Creosote, *ex* works, in bulk, North, liquid and salty, 4¾d. to 5d.; low gravity, 4½d. to 4¾d. Heavy oils, in bulk, North, 5d. to 5¼d. Carbolic acid 60's, 2s. 4d. to 2s. 6d. Naphthalene, £21 to £23. Salts, 95s. to 100s., bags included. Anthracene "A" quality, 3d. to 3½d. per minimum 40%, purely nominal; "B" quality, unsalable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *July* 18.

Conditions are very quiet at present and practically no new business is being arranged.

Crude gas-works tar.—The actual value is 34s. to 35s. per ton *ex* works in bulk.

Pitch remains nominal and quotations are about 32s. 6d. to 35s. per ton f.o.b. Glasgow for export, and 32s. 6d. per ton *ex* works in bulk for home trade.

Refined tar.—Very little new business is being arranged and prices are 3d. to 3¼d. per gallon f.o.r. for export, and 3¾d. to 4d. per gallon *ex* works in buyers' packages for home trade.

Creosote oil.—Tar acid oils continue firm and other grades are as previously reported. B.E.S.A. Specification, 5d. to 5¼d. per gallon; low gravity, 5d. to 5¼d. per gallon; neutral oil, 4¾d. to 5d. per gallon; all *ex* works in bulk.

Cresylic acid is more or less unchanged from last week with prices firm as follows: Pale, 97/99%, 2s. 2d. to 2s. 4d. per gallon; dark, 97/99%, 1s. 11d. to 2s. 1d. per gallon; pale, 99/100%, 2s. 7d. to 2s. 10d. per gallon; all *ex* works in buyers' packages.

Crude naphtha.—Available supplies command about 5½d. to 6d. per gallon *ex* works in bulk, according to quality and district.

Solvent naphtha.—90/160 quality is 1s. 5½d. to 1s. 6½d. per gallon, and 90/190 heavy quality is 1s. 1d. to 1s. 2d. per gallon.

Motor benzole continues at 1s. 3½d. to 1s. 4d. per gallon.

Pyridines.—90/160 grade is 5s. to 5s. 6d. per gallon, and 90/140 grade is 5s. 6d. to 6s. per gallon.

Benzole Prices.

These are considered to be the market prices for benzole at the present time:

	s.	d.		s.	d.	
Crude benzole	0	8½	to	0	9	per gallon at works
Motor "	1	2	"	1	2½	" " "
90% "	1	3	"	1	3½	" " "
Pure "	1	7	"	1	7½	" " "

Contracts Advertised To-Day

Boosting Plant.
Wigan Gas Department. [p. 236.]

Lamp Poles.
Dewsbury Gas Department. [p. 236.]

Overseas Opportunities

Iraq.

The Commercial Secretary to H.M. Embassy at Bagdad reports that the Bagdad District Water Board is calling for tenders, to be presented in Bagdad by Aug. 4, 1936, for the supply and delivery of cast or spun iron spigot and socket pipes. (Ref. T.Y. 30,399.)

The Commercial Secretary to H.M. Embassy at Bagdad reports that the Bagdad District Water Board is calling for tenders, to be presented in Bagdad by Aug. 4, 1936, for the supply and delivery of steel or asbestos cement piping. (Ref. T.Y. 30,400.)

Argentina.

The Commercial Counsellor to H.M. Embassy at Buenos Aires reports that the Argentine State Railways are calling for tenders, to be presented in Buenos Aires by Aug. 6, 1936, for the supply and delivery of seamless copper tubes of various sizes. (Ref. T.Y. 30,404.)

Trade Notes

Metropolitan Gas Meters, Ltd.

The retirement of Mr. A. D. Pettigrew, for over forty years Secretary of Metropolitan Gas Meters, Ltd., Nottingham, was marked by a suitable presentation from the staff and employees of the firm at the Carlton Hotel, Nottingham, on July 8. The presentation was made by the General Manager, Mr. J. H. Bingham, M.I.Mech.E., M.I.Chem.E., Assoc.Inst.Gas E.

The Asbestos Manufactures Company, Ltd.

We have received from the Asbestos Manufactures Company, Ltd., of 47, Victoria Street, S.W. 1, a copy of their latest catalogue, "The Best in Asbestos." The publication is amply illustrated and is sectionalized with a thumb index which facilitates rapid reference. The catalogue describes some of the Firm's specialities in packings, jointings, and beltings. They will be pleased to send copies to any of our readers who apply for same.

A Merger.

With a view to enlarging the scope of the respective businesses, a merger of interests has been concluded between the well-known engineering firms of Messrs. Broom & Wade, Ltd. of High Wycombe, and B.E.N. Patents, Ltd., of Park Royal, London. It will be recollected that Messrs. Broom & Wade, Ltd., manufacture a complete range of Portable and Stationary Air Compressors and Pneumatic Tools, while the products of B.E.N. Patents, Ltd., include a range of small Air Compressors, Paint Spray, and Garage Equipment. Apart from a further interchange of Directors, the management and affairs of the two Companies will continue as before.

STOCK AND SHARE LIST

Official Quotations on the London Stock Exchange

Issue. £	Stock or Share	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations July 17.	Rise or Fall on Week.	Transactions, Lowest and Highest Prices During the Week.
1,767,439	Stk.	Mar. 16	7	7⅜	Alliance & Dublin Ord. ...	160—165	+2½	161—163¾
374,000	,,	June 22	4	4	Do. 4 p.c. Deb. ...	94—99	...	...
557,655	,,	Feb. 17	7	7	Barnet Ord. 7 p.c.	169—174	...	...
300,000	1	Mar. 30	1/4½	1/9½	Bombay, Ltd.	1¾—1⅞	...	...
179,305	Stk.	Mar. 2	9½	9½	Bournemouth sliding scale ...	220—230	...	...
590,407	,,	,,	7	7	Do. 7 p.c. max. ...	170—175	...	...
493,960	,,	,,	6	6	Do. 6 p.c. Pref. ...	148—153	...	149—151½
50,000	,,	June 22	3	3	Do. 3 p.c. Deb. ...	84—89	...	88
262,025	,,	,,	4	4	Do. 4 p.c. Deb. ...	105—110	...	...
335,000	,,	,,	5	5	Do. 5 p.c. Deb. ...	123—128	...	...
357,900	,,	Feb. 17	7½	7½	Brighton, &c., 6 p.c. Con. ...	170—175	...	173—174½
649,955	,,	,,	6¾	6¾	Do. 5 p.c. Con. ...	155—160	...	157½—159
205,500	,,	,,	6	6	Do. 6 p.c. 'B' Pref.	144—149	...	...
855,000	,,	Mar. 2	7	8	British Ord.	158—163	...	160½—161
100,000	,,	June 8	7	7	Do. 7 p.c. Pref.	151—156	...	153
350,000	,,	,,	5½	5½	Do. 5½ p.c. 'B' Cum. Pref.	108—113	...	...
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...	...
450 000	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	110—115	+5	114
200,000	,,	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	97—99	...	98
100,000	10	22 May '33	6	4	Cape Town, Ltd.	1—3	...	28.—31/9
100,000	10	6 Nov.'33	4½	4½	Do. 4½ p.c. Pref. ...	1—3	...	...
150,000	Stk.	June 22	4½	4½	Do. 4½ p.c. Deb. ...	80—85	...	...
626.860	,,	Feb. 3	6	6	Cardiff Con. Ord.	130—135	...	...
237,860	,,	June 8	5	5	Do. 5 p.c. Red. Deb.	108—113	...	...
98,936	1	Apl. 20	2/-	2 -	Colombo, Ltd., Ord.... ...	1⅜—1⅝	...	35/-
24,500	1	,,	1/4¼	1/4¼	Do. 7 p.c. Pref....	20/—22/-	...	...
609,204	1	Mar. 30	-/11·48	- 11·48	Colonial Gas Assn. Ltd. Ord.	18/—20/-	...	18/10½—19/4½
296,053	1	,,	1/3·30	1/3·30	Do. 8 p.c. Pref	22/—24/-	...	23/6
1,775,005	Stk.	Feb. 3	5	5	Commercial Ord.	95—100	...	...
620,000	,,	June 8	3	3	Do. 3 p.c. Deb. ...	84—89	...	86
286,314	,,	Feb. 17	5	5	Do. 5 p.c. Deb. ...	120—125	...	...
807,560	,,	,,	7	7	Croydon sliding scale ...	160—165	...	162
644,590	,,	,,	5	5	Do. max. div.	115—120	...	118
620.385	,,	June 22	5	5	Do. 5 p.c. Deb....	121—126	...	...
239.000	,,	Feb. 3	5	5	East Hull Ord. 5 p.c....	107—110	...	...
184.555	,,	Feb. 17	6	6	East Surrey Ord. 5 p.c. ...	130—135	...	...
176,211	,,	June 8	5	5	Do. 5 p.c. Deb. ...	120—125	...	...
19.284.128	,,	Feb. 3	5⅜	5⅜	Gas Light & Coke 4 p.c. Ord.	27/6—28 6a	...	27.7½—27/10½
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max.... ...	90—93	...	90½—92½
4,477,106	,,	,,	4	4	Do. 4 p.c. Con. Pref. ...	105—109	...	107½—109
8,602,497	,,	May 18	3	3	Do. 3 p.c. Con. Deb. ...	87—90	...	88½—89½
3,642.770	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	116—119	...	118—118½
3,500,000	,,	,,	4½	4½	Do. 4½ p.c. Red. Deb. ...	114—117	...	116¼—116½
270,466	,,	Feb. 17	6	6	Harrogate New Cons. ...	130—135	...	...
157,500	1	Mar. 16	1/7½	1/7½	Hongkong & China, Ltd. ...	1 7/8—1 15/16	...	...
213,200	Stk.	Mar. 2	6	6	Hornsey Con. 3½ p.c. ...	135—140	...	136½—137½
5,600,000	,,	May 18	8	12	Imperial Continental Cap. ...	143—148	−4	143—149
223,130	,,	Jan. 20	3½	3½	Do. 3½ p.c. Red. Debs.	92—97	...	95¾—96½
285,242	,,	Feb. 17	8½	8½	Lea Bridge 5 p.c. Ord. ...	175—180	...	...
165,736	,,	Mar. 16	8	10	Maidstone 5 p.c. Cap. ...	180—190	...	...
63,480	,,	June 22	3	3	Do. 3 p.c. Deb. ...	80—85	...	...
75,000	,,	May 18	110	110	Malta & Mediterranean ...	195—205	...	...
392.000	—	Apl. 1	5½	5½	Metropolitan (of Melbourne) 5½ p.c. Red. Deb.	102—107	...	...
231,978	Stk.	Feb. 17	5	5	M.S. Utility 'C' Cons. ...	110—115	...	...
818,657	,,	,,	4	4	Do. 4 p.c. Cons. Pref.	102—107	...	104½—107
360,075	,,	June 22	4	4	Do. 4 p.c. Deb. ...	103—108	...	107—107¼
148,955	,,	,,	5	5	Do. 5 p.c. Deb. ...	122—127	...	...
125.000	—	July 1	3½	3½	Do. 3½ p.c. Rd. Rg. Bds.	97—100	...	...
675.000	Stk.	June 22	3	16	Montevideo, Ltd.	68—73	...	70—71
225,000	,,	Feb. 17	7½	7½	North Middlesex 6 p.c. Con.	172—177	+3	173
396,160	,,	Feb. 3	5	5	Northampton 5 p.c. max. ...	110—115	...	...
300,000	,,	Apl. 20	19	17	Oriental, Ltd....	165—170	...	167½—169½
416,617	,,	June 8	8	8	Plymouth & Stonehouse 5 p.c.	163—168	...	...
504,416	,,	Feb. 3	8½	8½	Portsmouth & Gosport Cons.	170—175	...	...
241,446	,,	,,	5	5	Do. 5 p.c. max. ...	110—115	...	...
73,350	,,	Feb. 17	...	5	Do. 5 p.c. Pref. ...	118—123	−12	...
114.000	,,	Feb. 3	5	5	Preston 5 p.c. Pref.	110—115	...	...
355,698	1	Apl. 20	1/-	1/-	Severn Va'. Gas Cor. Ld. Ord.	21.—23/-	...	21/1½—22/1½
454,510	1	Mar. 16	-/10½	-/10½	,, ,, 4½ p.c. Cum. Pref.	21/—23 -	...	22/1½
133,201	Stk.	Feb. 17	8½	5	Shrewsbury 5 p.c. Ord. ...	147—152	...	...
90,000	10	June 8	13½	14	South African...	4—5	...	85/—90/-
1,106,173	1	May 4	1/2½	1/2½	South East'n Gas Cn. Ld. Ord.	26 —28 -	...	27/6
845,511	1	Mar. 16	-/10½	-/10½	Do. 4½ p.c. Red. Cum. Pref.	21 —23 -	...	22/7½
200,000	1	,,	4	4	Do. 4 p.c. Cum. Pre'. ...	20 9—21 9	...	21/3—21/4½
450,000	Stk.	Feb. 17	4	4	Do. 4 p.c. Red. Deb. ...	101—104	...	...
6,709,895	,,	Feb. 3	5	6½	South Met. Ord.	123—126	...	123—125
1,135,812	,,	,,	6	6	Do. 6 p.c. Irred. Pf....	145—150	...	149½
850,000	,,	,,	4	4	Do. 4 p.c. Irred. Pf....	104—107	...	...
1,895,445	,,	June 22	3	3	Do. 3 p.c. Deb. ...	87—90	...	88¼
1,000,000	,,	July 6	5	5	Do. 5 p.c. Red. Deb.	113—116*	...	...
1,543,795	,,	Feb. 3	6	6	South Suburban Ord. 5 p.c....	131—136	...	132½
512,825	,,	,,	5	5	Do. 5 p.c. Pref....	122—127	...	...
500.000	,,	,,	4	4	Do. 4 p.c. Pref....	103—108	...	...
888,587	,,	June 8	5	5	Do. 5 p.c. Deb....	121—126	...	...
250,000	,,	,,	4	4	Do. 4 p.c. Deb....	102—107	...	...
427,859	1	May 4	9½	1/2½	S. Western Gas & Water Ord.	21 6—23/6	...	22/9
160,523	1	Apl. 20	...	-/10½	Do. 4½% Red. Cum. Pref.	21 —23/-	...	...
110,000	Stk.	June 22	4	4	Do. 4% Red. Deb. ...	100—105	...	...
647,740	,,	Feb. 3	5	5	Southampt'n Ord. 5 p.c. max.	115—120	...	117
121,275	,,	June 8	4	4	Do. 4 p.c. Deb.	100—105	...	...
350,000	,,	Feb. 3	5½	5½	Swansea 5½ p.c. Red. Pref. ...	111—116	...	...
106,000	,,	June 8	6½	6½	Do. 6½ p.c. Red. Deb. ...	98—101	...	...
94,000	,,	,,	...	...	Do. 3½ p.c. Red. Deb.	95—100	...	...
1,076,490	,,	Feb. 17	6⅔	6⅔	Tottenham and District Ord.	150—155	...	153
409,835	,,	,,	5⅓	5⅓	Do. 5½ p.c. Pref....	130—135	...	130½—134½
62,235	,,	,,	5	5	Do. 5 p.c. Pref. ...	122—127	...	124⅜
371,850	,,	June 8	4	4	Do. 4 p.c. Deb. ...	102—107	...	...
369,774	,,	Feb. 3	7	7	Uxbridge, &c., 5 p.c. ...	153—158	...	156
108,330	,,	,,	5	5	Do. 5 p.c. Pref. ...	122—127	...	...
1,340,521	,,	Feb. 3	7	7	Wandsworth Consolidated ...	159—164	...	161½—163
1,371,373	,,	,,	5	5	Do. 5 p.c. Pref. ...	122—127	...	124—125½
500,000	,,	...	...	...	Do. 4 p.c. Pref. ...	104½—106½	...	105⅝
1,317,964	,,	June 8	5	5	Do. 5 p.c. Deb. ...	123—128	...	125—127
338,300	,,	,,	4	4	Do. 4 p.c. Deb. ...	103—108	...	...
499,735	,,	Feb. 17	6⅔	7½	Watford and St. Albans Ord.	155—160	...	158¾
200,000	,,	,,	5	5	Do. 5 p.c. Pref. ...	120—125	...	...
200,000	,,	,,	5½	5½	Do. 5½ p.c. Pref. ...	133—138	...	...
200,000	,,	June 22	4	4	Do. 4 p.c. Red. Deb.	100—105	...	...
100,000	,,	,,	...	3½	Do. 3½ p.c. Red. Deb.	99—102	...	...
158,400	,,	Mar. 2	5	6b	Winchester W. & G. 5 p.c. Con.	122—127	...	...

a.—The quotation is per £1 of Stock. b.—Paid £3, including 10s. on account of back dividends. * Ex div. † Paid free of income-tax. ‡ For year.

Stock and Share List continued overleaf.

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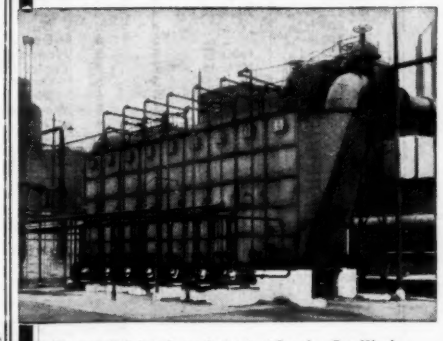
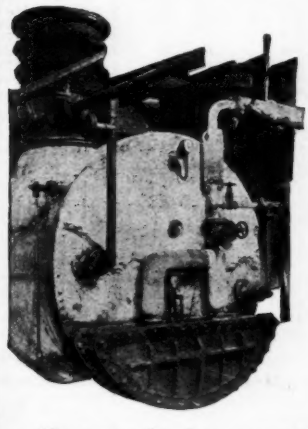


"Permac" joints in an important London Gas Works.



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Issue. £	Stock or Share	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations. July 17	Rise or Fall on Week.	Transactions, Lowest and Highest During the Week.
BRISTOL EXCHANGE.								
347,756	Stk.	Feb. 3	5	6	Bath Cons.	124—126	...	...
1,667,250	,,	July 6	5	5	Bristol, 5 p.c. max.	121—122*	+2	...
120,420	,,	June 8	4	4	Do. 1st 4 p.c. Deb. ...	101½—103½	...	...
217,870	,,	,,	4	4	Do. 2nd 4 p.c. Deb. ...	101½—103½	...	...
328,790	,,	,,	5	5	Do. 5 p.c. Deb.	124—127	...	...
274,000	,,	Feb. 17	5	5	Newport (Mon.) 5 p.c. max. ...	111—116	...	...
13,200	12	Mar. 16	7	8½	Pontyp'l Gas & W. 10 p.c. 'A.'	14—15	...	...
13,600	10	,,	5	6	Do. 7 p.c. 'B.'	11½—12½	...	...
40,000	10	,,	5	6	Do. 7 p.c. 'C.'	11½—12½	...	...
140,778	Stk.	Feb. 17	5	5	Weston-super-Mare Cons. ...	113—115	...	...
64,338	,,	June 22	4	4	Do. 4 p.c. Deb.	96½—98½	...	...
33,340	,,	,,	7½	7½	Do. 7½ p.c. Deb.	163—166	...	...
LIVERPOOL EXCHANGE.								
157,150	Stk.	Feb. 3	5	6½	Chester 5 p.c. Ord.	109—114	...	...
92,500	,,	June 8	4	4	Do. 4 p.c. Pref.	98½—103½	...	...
32,540	,,	,,	3½	3½	Do. 3½ p.c. Deb. ...	90—95	...	...
41,890	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	98½—103½	...	...
2,167,410	,,	Feb. 17	6	6	Liverpool 5 p.c. Ord. ...	136—137	...	...
245,800	,,	June 22	5	5	Do. 5 p.c. Red. Pref ...	103—108	...	...
306,083	,,	July 6	4	4	Do. 4 p.c. Deb. ...	104—106*	...	...
106,280	,,	Feb. 3	10	10	Preston 'A' 10 p.c. ...	202—212	...	...
189,219	,,	,,	7	7	Do. 'B' 7 p.c.	140—150	...	...
NEWCASTLE EXCHANGE.								
122,877	Stk.	Mar. 2	8	8	Blyth 5 p.c. Ord.	154—156	...	...
732,000	,,	Feb. 3	5	5	Hartlepool G. & W. Co. & New	120—122	...	...
2,061,315	,,	Feb. 3	5	5½	Newcastle & Gateshead Con.	26/6—27/-a	...	...
682,856	,,	,,	4	4	Do. 4 p.c. Pref. ...	107½—108½	...	...
776,704	,,	June 22	3½	3½	Do. 3½ p.c. Deb. ...	100—101	...	...
277,285	,,	May 4	5	5	Do. 5 p.c. Deb. '43...	103—104	...	...
209,820	,,	Mar. 2	8½	8½	South Shields Con.	169—171	...	...
299,542	,,	Feb. 3	6	6	Sunderland 6 p.c. max. ...	129—131	...	...
NOTTINGHAM EXCHANGE.								
542,270	Stk.	Feb. 17	7	10	Derby Con.	176—186	...	...
55,000	,,	June 22	4	4	Do. 4 p.c. Deb.	100—105	...	...
84,750	,,	Feb. 17	5	12	Long Eaton 'A' Ord. ...	175—185	...	...
50,000	,,	,,	4	10	Do. 'B' Ord. ...	130—140	...	...
20,000	10	June 8	5	5	Do. 5 p.c. Pref. ...	10—12	...	...
80,000	Stk.	,,	5	5	Do. 5 p.c. Deb. ...	117—122	...	...
SHEFFIELD EXCHANGE.								
10,000	Stk.	Feb. 17	10	10	Great Grimsby 'A' Ord. ...	220—230	...	...
6,500	,,	,,	10	10	Do. 'B' Ord. ...	220—230	...	...
79,000	,,	,,	10	10	Do. 'C' Ord. ...	205—215	...	...
1,806,339	,,	Feb. 17	6	6	Sheffield Cons.	146—148	...	...
95,000	,,	July 6	4	4	Do. 4 p.c. Deb.	99—101*	...	...

a The quotation is per £1 of Stock.

Supplementary List of Stocks and Shares not Officially Quoted

202,152	Stk.	...	...	...	Ascot Ord.	119—124	...	...
128,182	,,	July 6	...	5	Do. 5 p.c. Pref.	115—120*	...	...
238,631	1	June 8	5	5	Assd. Gas and Water Ord. ...	21/—23/-	...	21/6
323,681	1	,,	4½	4½	Do. 4½ p.c. Cum. Pref. ...	21/—23/-	...	21/9—23/-
150,000	Stk.	...	...	...	Do. 3½ p.c. Red. Deb. ...	...	...	...
17,000	,,	Feb. 17	8	8	Bognor Orig. Ord. 'A' ...	175—185	...	...
62,210	,,	,,	8	8	Do. New Addl. 'A' ...	175—185	...	...
87,160	,,	,,	7	7	Do. New 7 p.c. max. ...	145—150	...	...
37,440	,,	Feb. 3	10	10	Cam.Univ. & Town 10 p.c.max.	210—220	...	...
125,970	,,	,,	7	7	Do. 7 p.c. max.	158—163	...	...
39,025	,,	,,	5	5	Do. 5 p.c. max.	108—113	...	...
65,000	,,	Mar. 2	7½	8½	Eastbourne 'A' 5 p.c. ...	170—175	...	...
198,000	,,	,,	6	7	Do. 'B' 3½ p.c.	140—145	...	...
112,312	,,	,,	5	5	Do. 5 p.c. Pref.	120—125	...	...
130,000	,,	June 22	5	5	Do. 5 p.c. Deb.	122—127	+2	...
250,000	1	June 22	4	6	Gas Consolidation Ord. ...	20/—22/-	...	20/6—21/3
250,000	1	May 18	4	4	Do. 4 p.c. Red. Cum. Pref.	19/—20/	...	19/6—19/7½
700,000	Stk.	...	...	...	Gas Light & Coke 3½ p.c. Rd. Db	102½—104½	...	103½—104
24,000	30	Feb. 3	8½	8½	Great Yarmouth 8½ p.c. max.	52—57	...	...
59,400	30	,,	7½	7½	Do. 7½ p.c. max.... ...	42—45	...	...
51,160	Stk.	June 8	5½	5½	Do. 5½ p.c. Deb.... ...	123—128	...	...
152,600	,,	Mar. 2	8	8	Guildford Cons.	185—195	...	...
54,055	,,	,,	5	5	Do. 5 p.c. Pref.	114—119	...	...
68,250	,,	June 8	5	5	Do. 5 p.c. Deb.	120—125	...	...
156,600	,,	Feb. 3	7½	7½	Hampton Court Cons. ...	173—178	...	...
81,660	10	Feb 4,'35	5	9	Leatherhead Ord.	16—17	...	...
107,960	10	Mar. 16	4	5½	Mid Kent Ord.	10—11	...	...
230,940	Stk.	Feb. 17	10	10	Oxford & District Ord. ...	210—220	...	217—218
47,112	,,	,,	5	5	Do. 5 p.c. Pref.	118—123	...	...
50,000	,,	,,	6	6	Do. 6 p.c. Red. Pre ...	113—118	...	...
126,193	,,	May 18	7½	7½	Peterborough Ord.	157—167	...	...
64,990	,,	Mar. 16	6½	7½	Redditch Ord.	135—140	...	...
166,850	,,	Feb. 17	7	9	Romford Ord.	170—180	...	...
60,000	,,	,,	4	4	Do. 4 p.c. Pref.	97—100	...	...
44,000	,,	Mar. 16	5	5	Do. 5 p.c. Deb.	122—127	...	...
10,950	,,	Mar. 2	8	8	Ryde Ord.	165—170	...	...
136,191	,,	Feb. 3	5	7	Scarborough Ord.	128—138	...	...
27,825	,,	Feb. 3	8	8	Shanklin & Ventnor Cons. ...	152—162	...	...
40,643	,,	Mar. 2	7	7	Slough Ord.	147—152	...	...
221,000	,,	June 22	5	5	Do. 5 p.c. Deb.	116—121	...	...
28,872	1	May 4	5½	5½	S. Midland Gas Cpn.Ltd. Ord.	20/—22/-	...	...
28,866	1	Mar. 16	4½	4½	Do. 4½ p.c. Red. Cum Pref.	20/—22/-	+-/6	...
137,730	Stk.	Feb. 17	7	7	Southgate & Dist. 7 p.c. max.	153—158	...	...
62,500	,,	,,	5	5	Do. 5 p.c. Pref.	115—120	...	...
117,228	,,	Mar. 2	5	6	Swindon Cons.	111—116	...	...
60,425	,,	June 22	5	5	Do. 5 p.c. Deb.	120—125	...	...
50,000	1	Mar. 30	...	5·52d.	a Utd. Kingdom Gas Cpn. Ord.	20/6—22/6	...	21/6—22/-
760,910	1	,,	2½	2½	Do. 4½ p.c. Prefd. Ord....	20/—22/-	...	...
110,910	1	May 18	2½	4½	Do. 4½ p.c. Cum. Pref. ...	21/—23/-	...	21/7½—22/-
900,000	Stk.	Mar. 16	...	3½	Do. 3½ p.c. Red. Deb. ...	98—101	...	...
130,000	,,	Feb. 3	5	8	Wakefield Ord.	140—145	...	...
81,650	,,	,,	5	5	Do. 5 p.c. max.	105—110	...	...
82,000	,,	Feb. 3	6	6	Weymouth Ord.	106—111	...	...
98,384	,,	Feb. 3	6	6	Wolverhampton 6 p.c. Pref.	127—132	...	...
160,000	,,	June 8	5½	5½	Do. 5½ p.c. Rd. Db	107—112	...	...
370,000	,,	Feb. 3	4	6	York Cons.	107—112	...	111
90,000	,,	June 22	5	5	Do. 5 p.c. Red. Deb. ...	103—108	...	...
133,640	,,	Feb. 3	6½	6½	Yorktown (Cam.) 5 p.c. Cons.	130—135	...	...
120,000	,,	,,	5	5	Do. 5 p.c. Pref.	115—120	...	...
35,000	,,	June 22	5½	5½	Do. 5½ p.c. Deb.... ...	130—135	...	...

a Actual.

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TRALEE URBAN DISTRICT COUNCIL.

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The Council do not bind themselves to accept the highest or any Offer.

C. T. KENNEDY,
Clerk of Council.

Urban Council Chambers,
Tralee,
July 9, 1936.

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Rotary Meter Company, Ltd.	—
Rozalex, Ltd.	—
Ruscoe, John, & Co., Ltd.	—
Russell, R., & Sons, Ltd.	—

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Sawer & Purves	—
Scientific and Projections, Ltd.	—
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Humphreys-Glasgow Water Gas

Completed Installations

	Cu. Ft. Daily
Aarhus	800,000
Abertillery	600,000
Admiralty:	
British	4,000,000
French	1,600,000
Agram	200,000
Airdrie	433,000
Aldershot	1,400,000
Aldershot	1,000,000
Aldershot	1,316,000
Algiers	1,905,000
Alkmaar	400,000
Allenstein	200,000
Alost	700,000
Amersfoort	300,000
Amsterdam	1,000,000
Amsterdam	1,000,000
Amsterdam	2,700,000
Amsterdam	1,350,000
Antwerp	1,500,000
Antwerp	1,900,000
Antwerp	1,500,000
Antwerp	1,900,000
Arundel	215,000
Ascot	423,000
Ashford	250,000
Athens, Greece	550,000
Augsburg	425,000
Aylesbury	150,000
Aylesbury	470,000
Banbury	400,000
Banbury	450,000
Banff	8 1,000
Barmen	500,000
Barnsley	588,000
Barrow	300,000
Barrow	500,000
Barry	500,000
Barry	720,000
Bath	3,200,000
Bath	1,500,000
Bedford	1,000,000
Belfast	1,700,000
Belfast	4,500,000
Belfast	1,250,000
Belfast	1,250,000
Belfast	2,250,000
Benrath	125,000
Berkhampstead	250,000
Berlin:	
Charlottenb'g	2,500,000
Danziger Str.	1,600,000
Neukoelin	1,350,000
Schmargendorf	760,000
Tegel	10,095,000
Berne, Switz.	725,000
Bexhill	400,000
Bexhill	100,000
Bideford	258,000
Bilston	500,000
Birmingham:	
Adderley St.	675,000
Adderley St.	850,000
Nechells	3,000,000
Nechells	3,000,000
Nechells	3,000,000
Nechells	7,650,000
Swan Village	1,500,000
Windsor St.	3,000,000
Windsor St.	3,000,000
Windsor St.	6,100,000
Bishop's Stortford	500,000
Bishop's Stortford	500,000
Blackburn	1,190,000
Blantyre	150,000
Blois	250,000
Bochum	530,000
Bognor	423,000
Bognor	500,000
Bo'ness	125,000
Bo'ness	250,000
Boulogne	340,000
Bournemouth	1,000,000
Bournemouth	500,000
Bournemouth	2,000,000
Bournemouth	1,000,000
Bournemouth	1,530,000
Bournemouth	2,750,000
Bournemouth	2,750,000
Bradford	1,260,000
Bremen	1,850,000
Brentwood	250,000
Brescia	1,176,000
Brest	550,000
Bridgwater	200,000
Bridlington	450,000
Bridlington	450,000
Brieg	100,000
Brierley Hill	250,000
Brierley Hill	425,000
Brighton	5,500,000
Brighton	2,600,000
Brighton	2,000,000
Bristol	3,650,000
Bristol	4,000,000
Bromley	1,500,000
Bruges	800,000
Brussels:	
Anderlecht	700,000
Forest	4,588,000
Koekelberg	1,000,000
St. Gilles	1,000,000
St. Josse	2,375,000
Ville	3,350,000
Bucarest	1,100,000
Buckie	164,000
Budapest	2,250,000
Burnley	1,350,000
Caen	250,000
Cambridge	500,000
Cambridge	1,000,000
Cambridge	1,700,000
Cambridge	1,900,000
Cardiff	2,000,000
Cardiff	3,600,000
Cardiff	1,950,000
Carlisle	600,000
Carlsruhe	500,000
Carnarvon	248,000
Charleroi	1,250,000
Châteauroux	250,000
Châtelet	500,000
Chester	564,000
Chesterfield	520,000
Chesterton	197,000
Chichester	250,000
Chorley	300,000
Cie. de Béthune	2,145,000
Cie. de Béthune	2,410,000
Cie. des Compteurs	1,150,000
Cie. Lorraine de Ch.	210,000
Cie. Mines de Roche	585,000
Clermont-Ferrand	990,000
Complete Gasification	
Coatbridge	400,000
Commercial, L'n	850,000
Commercial	850,000
Commercial	1,250,000
Commercial	2,000,000
Commercial	1,600,000
Commercial	800,000
Commercial	2,100,000
Copenhagen	700,000
Copenhagen	2,500,000
Copenhagen	1,750,000
Copenhagen	1,200,000
Courtrai	250,000
Coventry	1,000,000
Coventry	1,000,000
Coventry	1,600,000
Cowdenbeath	420,000
Cracow	400,000
Cranleigh	188,000
Crefeld	500,000
Crewe	700,000
Crewe	900,000
Crosfield & Sons	3,000,000
Croydon	1,250,000
Croydon	950,000
Croydon	950,000
Croydon	1,275,000
Croydon	3,000,000
Croydon	6,000,000
Deal	250,000
Deal	250,000
Debreczin	100,000
Derby	1,500,000
Derby	2,000,000
Deventer	350,000
Devonport	1,600,000
Devonport	1,100,000
Doncaster	1,350,000
Doncaster	1,350,000
Dorking	280,000
Dorking	300,000
Dover	500,000
Dover	300,000
Dublin	2,000,000
Dublin	2,000,000
Dublin	650,000
Dudley	600,000
Dundee	3,300,000
Dundee	1,650,000
Dunedin, N.Z.	150,000
Dunedin	275,000
Durham	200,000
Dusseldorf	1,000,000
Eastbourne	1,250,000
Eastbourne	1,550,000
Edinburgh	2,000,000
Edinburgh	2,800,000
Eindhoven	1,500,000
Electro-Chimie	650,000
Enschede	282,000
Epping	500,000
Epsom	225,000
Epsom	300,000
Essen	1,400,000
Essen-Borbeck	1,400,000
Exeter	1,100,000
Exeter	1,200,000
Exmouth	376,000
Falmouth	150,000
Falmouth	200,000
Falmouth	500,000
Farnham	300,000
Faversham	200,000
Faversham	210,000
Featherstone	250,000
Flensburg	425,000
Folkestone	1,800,000
Fond. del Pignone	164,000
Forst	300,000
Frankenthal	175,000
Fuel Research Wks.	500,000
Fuel Research Wks.	500,000
Gablonz	140,000
Gas L. & C. Co.:	
Beckton	10,000,000
Beckton	7,000,000
Beckton	3,500,000
Beckton	7,000,000
Beckton	7,000,000
Beckton	5,250,000
Beckton	4,500,000
Beckton	3,000,000
Beckton	1,500,000
Bow Common	1,150,000
Bow Common	1,150,000
Brentford	1,550,000
Brentford	850,000
Brentford	750,000
Brentford	6,000,000
Bromley	3,750,000
Bromley	2,250,000
Bromley	1,000,000
Bromley	1,000,000
Bromley	1,000,000
Bromley	1,450,000
Bromley	1,350,000
Fulham	2,500,000
Fulham	1,700,000
Grays	250,000
Grays	400,000
Gas L. & C. Co.:	
Grays	725,000
Ilford	650,000
Ilford	750,000
Kensal Green	2,250,000
Kensal Green	2,250,000
Kensal Green	2,250,000
Nine Elms	2,750,000
Nine Elms	750,000
Nine Elms	1,870,000
Nine Elms	2,850,000
Shoreditch	900,000
Shoreditch	2,700,000
Shoreditch	2,725,000
Southall	2,000,000
Southall	3,000,000
Staines	600,000
Stratford	1,700,000
Stratford	850,000
Stratford	2,350,000
Stratford	2,350,000
Gelsenkirchen	525,000
Geneva	500,000
Geneva	700,000
Geneva	1,270,000
Gennevilliers	10,600,000
Gennevilliers	2,900,000
Girvan	235,000
Glasgow	3,000,000
Glasgow	2,500,000
Glasgow	2,250,000
Glossop	340,000
Gloucester	800,000
Gloucester	1,000,000
Gosport	200,000
Gosport	225,000
Göteborg	300,000
Göteborg	600,000
Göteborg	1,000,000
Graudenz	200,000
Groningen, Holland	500,000
Groningen	1,250,000
Guest Keen & F.	1,936,000
Guildford	1,050,000
Guildford	1,100,000
Haarlem	850,000
Halifax	700,000
Hamburg	1,750,000
Hampton Court	500,000
Hampton Court	600,000
Hampton Court	1,100,000
Hanley	800,000
Hanley	800,000
Hartlepool	750,000
Hartlepool	765,000
Hassocks	80,000
Hastings	1,250,000
Haywards Heath	470,000
Haywards Heath	500,000
Helsden Bridge	200,000
Heidelberg	200,000
Hereford	525,000
Hertford	441,000
Hessle	150,000
Heywood	500,000
High Wycombe	752,000
High Wycombe	1,000,000
Hilversum	850,000
Hilversum	1,000,000
Hinckley	250,000
Hinckley	135,000
Holyhead	197,000
Hong Kong	900,000
Hornsey	1,000,000
Hornsey	1,000,000
Hornsey	750,000
Hornsey	750,000
Horsham	235,000
Houilière de Lievin	2,900,000
Hull	1,500,000
Hull	1,000,000
Hull	1,600,000
Innsbruck	200,000
Ipswich	750,000
Ipswich	1,250,000
Ipswich	600,000
Jersey	564,000
Jersey	564,000
Kampen	350,000
Karlsbad	350,000
Kendal	329,000
Kettering	750,000
Kidsgrove	235,000
Kiel	1,880,000
Kilmarnock	500,000
Kilmarnock	585,000
King's Lynn	197,000
King's Lynn	400,000
Kingston-on-Th.	3,400,000
Kirkintilloch	360,000
Kirkintilloch	827,000
Kolozvar	100,000
Lancaster	500,000
Langley Mill	500,000
Largs	235,000
Lausanne	250,000
Lausanne	385,000
Lausanne	970,000
Lea Bridge	550,000
Lea Bridge	550,000
Lea Bridge	1,000,000
Lea Bridge	1,500,000
Lea Bridge	1,530,000
Leamington	600,000
Leamington	525,000
Leatherhead	705,000
Leeds	1,500,000
Leeuwarden	400,000
Leicester	2,700,000
Leiden	500,000
Leiden	575,000
Leigh	350,000
Lemberg	760,000
Letchworth	362,000
Letchworth	423,000
Liége	1,000,000
Liége	750,000
Lille	860,000
Lille	1,410,000
Lincoln	500,000
Lincoln	893,000
Littlehampton	500,000
Liverpool	3,500,000
Liverpool	4,500,000
Liverpool	750,000
Liverpool	1,750,000
Liverpool	1,250,000
Liverpool	3,000,000
Liverpool	1,500,000
Liverpool	1,250,000
Liverpool	2,350,000
Liverpool	3,000,000
Liverpool	8,600,000
Long Eaton	430,000
Long Eaton	170,000
Longton	600,000
Louvain	800,000
Lubeck	400,000
Luton	400,000
Luton	1,200,000
Maastricht	200,000
Macclesfield	800,000
Magdeburg	1,400,000
Maidenhead	225,000
Maidenhead	225,000
Maidenhead	175,000
Maidenhead	175,000
Maidenhead	200,000
Maidenhead	200,000
Maidstone	500,000
Maidstone	500,000
Malines	500,000
Malines	575,000
Malmo	350,000
Malta	400,000
Manchester	3,500,000
Manchester	3,500,000
Manchester	1,500,000
Mansfield	330,000
Mansfield	493,000
Margate	960,000
Maribourgh	100,000
Mayence	700,000
Melbourne	5,000,000
Merthyr Tydfil	300,000
Merthyr Tydfil	200,000
Middlesbrough	1,250,000
Middlesbrough	750,000
Middlesbrough	900,000
Middlesbrough	1,300,000
M.M. Woolston	9,000,000
Minehead	300,000
Monaco	275,000
Monaco	618,000
Monaco	618,000
Monaco	400,000
Complete Gasification	
Mons	500,000
Montevideo	1,222,000
Morecambe	333,000
Moscow	1,500,000
Munich	1,400,000
Namur	175,000
Narbonne	350,000
Nelson	400,000
Nelson	350,000
Neuchâtel, Switz.	250,000
Neuchâtel	250,000
Neuss	140,000
Newbury	250,000
Newcastle	2,500,000
Newcastle	3,000,000
Newcastle, N.S.W.	500,000
Newhaven	235,000
Newport Pagnell	188,000
Nice	1,235,000
Nice	1,295,000
Nietheroy	250,000
Nimes	420,000
North Middlesex	200,000
North Middlesex	200,000
North Middlesex	1,000,000
North Middlesex	1,600,000
North Middlesex	800,000
Complete Gasification.	
North Middlesex	900,000
2nd Complete Gasification.	
North Sydney	500,000
North Sydney	500,000
Norwich	1,000,000
Norwich	300,000
Norwich	500,000
Norwich	1,500,000
Nottingham	1,000,000
Nottingham	1,000,000
Nuneaton	125,000
Oberhausen	175,000
Oldbury	500,000
Oldenburg	200,000
Ormskirk	170,000
Ostend	300,000
Zandvoorde	700,000
Oswaldtwistle	200,000
Oxford	4,500,000
Paisley	750,000
Palermo	968,000
Palermo	850,000
Paris:	
Clichy	4,000,000
Ivry	2,355,000
Landy	6,000,000
Landy	6,000,000
Landy	5,295,000
La Villette	4,000,000
La Villette	2,000,000
La Villette	2,000,000
Paris-Plage	125,000
Pau	550,000
Pavie	406,000
Pembroke	240,000
Perigueux	350,000
Perth, W.A.	125,000
Perth, W.A.	1,000,000
Petone, N.Z.	200,000
Piggott & Co.	1,500,000
Plymouth	2,000,000
Poitiers	350,000
Pontypool	120,000
Port Elizabeth	400,000
Portsmouth	1,800,000
Portsmouth	2,000,000
Portsmouth	2,000,000
Posen	1,150,000
Prague	140,000
Preston	1,400,000
Pwllheli	60,000
Ramsgate	430,000
Reading	1,000,000
Reading	1,000,000
Reading	600,000
Redditch	500,000
Redhill	600,000
Redhill	600,000
Redhill	1,100,000
Reichenberg	400,000
Reval	350,000
Rhymney	175,000
Rhymney	250,000
Riddings	258,000
Ripley	120,000
Rochester	2,200,000
Rochester	2,800,000
Romford	300,000
Romford	350,000
Romford	1,200,000
Rotterdam	850,000
Rotterdam	1,500,000
Rotterdam	750,000
Rotterdam	750,000
Rotterdam	600,000
Rotterdam	2,000,000
Rotterdam	500,000
Roulers, Belgium	250,000
Royston (Yorks.)	250,000
Rugby	1,000,000
Rugby	450,000
Rushden	425,000
Rushden	517,000
Rushden	225,000
Ryde	600,000
Ryde	600,000
Saffron Walden	235,000
St. Albans	700,000
St. Albans	580,000
St. Albans	1,500,000
St. Andrews	210,000
St. Andrews	500,000
St. Andrews	390,000
St. Gallen	450,000
St. Ives (Hunts)	80,000
St. Nicolas, Belgium	250,000
Sté. Ch.Gr. Paroisse	1,320,000
Sté.Ch Gr Paroisse	2,900,000
Sté. I. & F. de Lens	1,130,000
Sté. I. & F. de Lens	1,130,000
Sté. Kuhlmann	1,285,000
Sté. Kuhlmann	3,200,000
Sté. Kuhlmann	2,150,000
Sté. Kuhlmann	3,830,000
Sté. Tubes Meuse	545,000
San Paulo	700,000
Sarragosse	264,000
Scarborough	1,350,000
Scarborough	1,300,000
Scarborough	1,350,000
Seaford	200,000
Shanghai	225,000
Shanghai	225,000
Shanghai	1,600,000
Shanghai	2,200,000
Shanklin	250,000
Shanklin	400,000
Sheerness	400,000
Sheerness	400,000
Sheffield	1,530,000
Sheffield	3,000,000
Steel Prods.	3,000,000
Shirebrook	500,000
Shrewsbury	300,000
Shrewsbury	170,000
Sidmouth	225,000
Singapore	600,000
Sittingbourne	259,000
Solihull	250,000
Southampton	800,000
Southampton	500,000
Southampton	600,000
Southampton	160,000
Southampton	1,000,000
Southampton	1,450,000
Southend	1,250,000
Southend	900,000
Southend	900,000
Southend	600,000
Southgate	400,000
Southgate	500,000
Southgate	800,000
Southgate	500,000
Southgate	1,900,000
Southport	750,000
Southport	900,000
Southport	900,000
Southport	450,000
South Shields	650,000
South Shields	1,250,000
Stafford	500,000
Stafford	750,000
Stamford	120,000
Stettin	883,000
Steyning	150,000
Stirling	400,000
Stirling	970,000
Stockholm	1,500,000
Stockholm	1,750,000
Stockport	600,000
Stockport	600,000
Stockport	400,000
Stockport	400,000
Stockton	500,000
Stockton	250,000
Stourbridge	500,000
Stourbridge	700,000
Sunderland	2,250,000
Sunderland	300,000
Sunderland	475,000
Sutton	1,583,000
Sutton	1,625,000
Swanage	500,000
Swansea	750,000
Swansea	1,000,000
Swansea	450,000
Swansea	1,250,000
Swansea	2,000,000
Swindon	300,000
Swindon	450,000
Swindon	450,000
Sydney	1,000,000
Sydney	1,000,000
Sydney	1,000,000
Sydney	1,000,000
Sydney	8,250,000
Sydney	2,750,000
Taunton	225,000
Taunton	350,000
Taye Valley	275,000
Teignmouth	200,000
The Hague	1,000,000
The Hague	500,000
The Hague	1,750,000
The Hague	1,500,000
The Hague	775,000
The Hague	1,500,000
The Hague	2,250,000
Tilburg	400,000
Tirlemont	120,000
Tokyo	2,000,000
Torquay	350,000
Torquay	350,000
Torquay	320,000
Tottenham	750,000
Tottenham	750,000
Tottenham	350,000
Tottenham	1,000,000
Tottenham	1,000,000
Tottenham	1,250,000
Tottenham	2,500,000
Tottenham	1,000,000
Tottenham	500,000
Tottenham	1,000,000
Toulouse	2,585,000
Toulouse Natl. Wks.	2,400,000
Toulouse Natl. Wks.	6,200,000
Toulouse Natl. Wks.	3,730,000
Tournai	700,000
Tours	350,000
Trowbridge	250,000
Trowbridge	150,000
Tunbridge Wells	1,000,000
Tunbridge Wells	1,000,000
Tunis	175,000
Tynemouth	1,100,000
Tynemouth	1,100,000
Ulm	400,000
Union Chim.-Belge	1,977,000
Utrecht	1,000,000
Utrecht	1,000,000
Uxbridge	752,000
Uxbridge	1,000,000
Vancouver	3,800,000
Verviers	1,000,000
Vevey, Switz.	600,000
Victoria, B.C.	500,000
Vienna	6,000,000
Walsall	750,000
Walsall	375,000
Waltham	400,000
Waltham	140,000
Walton-on-Thames	970,000
Walton-on-Thames	650,000
Wandsbek	125,000
Wandsworth	1,800,000
Wandsworth	4,230,000
Wanganui, N.Z.	376,000
Ware	150,000
Ware	282,000
Warwick	125,000
Wasmuel	500,000
Watford	300,000
Watford	350,000
Watford	400,000
Watford	1,250,000
Wath	430,000
Weimar	100,000
Wellingborough	525,000
Wellingborough	525,000
Wellingborough	550,000
Wellington, N.Z.	350,000
Wellington	300,000
West Bromwich	550,000
Westgate	250,000
Weston-Mare	750,000
Weston-Mare	750,000
Wexford	100,000
Weymouth	500,000
Weymouth	658,000
Whitstable	423,000
Widnes	500,000
Wiesbaden	850,000
Wigston	250,000
Winchester	225,000
Winchester	125,000
Winchester	410,000
Winchester	325,000
Woking	400,000
Wolverhampton	1,500,000
Wolverhampton	1,000,000
Wolverhampton	250,000
Wolverhampton	400,000
Worthing	525,000
Yarmouth	500,000
Yarmouth	125,000
Yeovil	340,000
Zwolle	200,000
Zwolle	200,000
Zwolle	700,000

Current Additional Construction

Now Aggregates 132,000,000 *Cubic Feet Daily*

Humphreys & Glasgow, Ltd., Humglas House, Carlisle Place, London, S.W.1